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NTC SCORPIONS'

SAWE/MILES II (Simulated Area Weapons Effects/ Multiple-Integrated Laser Engagement System II)

HANDBOOK NO. 98-1

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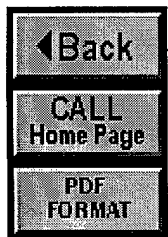
This handbook does not replace Technical Manuals. Rather, it is designed to highlight information and lessons that are applicable for training and combat operations.

The Secretary of the Army has determined that the publication of this manual is necessary in the transaction of the public business as required by law of the Department. Use of funds for printing this publication has been approved by Commander, U.S. Army Training and Doctrine Command, 1985, IAW AR 25-30.

Unless otherwise stated, whenever the masculine or feminine gender is used, both are intended.

NOTE: Any publications referenced in this newsletter (other than the CALL Newsletters), such as ARs, FM's, and TMs, must be obtained through your pinpoint distribution system.

LOCAL REPRODUCTION OF THIS HANDBOOK IS AUTHORIZED AND ENCOURAGED



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Last Update: 25 March 1998 (jjs)

Your comments are welcome ... send to: [call @ leav-emh1.army.mil](mailto:call@leav-emh1.army.mil)

PREFACE

MILES clearly rules the battlefield at the National Training Center. If units are proficient with MILES gunnery, they stand a superb chance of defeating the OPFOR. To assist units with their training, the Scorpion Mechanized Infantry Task Force Trainers at the NTC have developed this Simulated Area Weapons Effects (SAWE)/Multiple-Integrated Laser Engagement System (MILES) II Handbook to assist all units on how to train with the MILES. This document covers every aspect, from installation and troubleshooting to boresighting procedures for all weapons systems. Units who are proficient with MILES will greatly enhance their overall training effectiveness on the NTC battlefield.

TRAIN THE FORCE!

JD THURMAN
COLONEL, ARMOR
COMMANDER, OPERATIONS GROUP, NTC

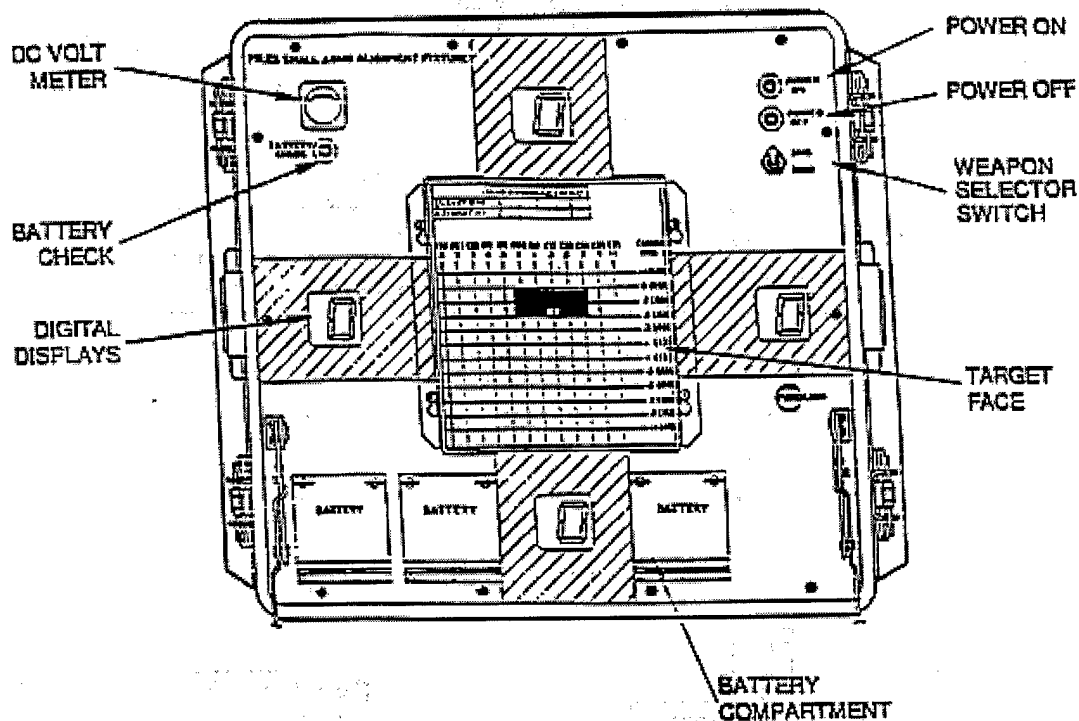
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Small Arms Alignment Fixture (SAAF)

SAAF

SMALL ARMS ALIGNMENT FIXTURE



SAAF FRONT PANEL

OPERATING PROCEDURES:

- Install 3 - 6 volt batteries.
- Power on SAAF.
- Digital displays will read 18.
- Engage center of Canadian bull.
- Read digital displays for adjustments.

NOTE: See M16 Boresight & Zeroing for SAAF operating techniques.

SAAF TROUBLESHOOTING GUIDE

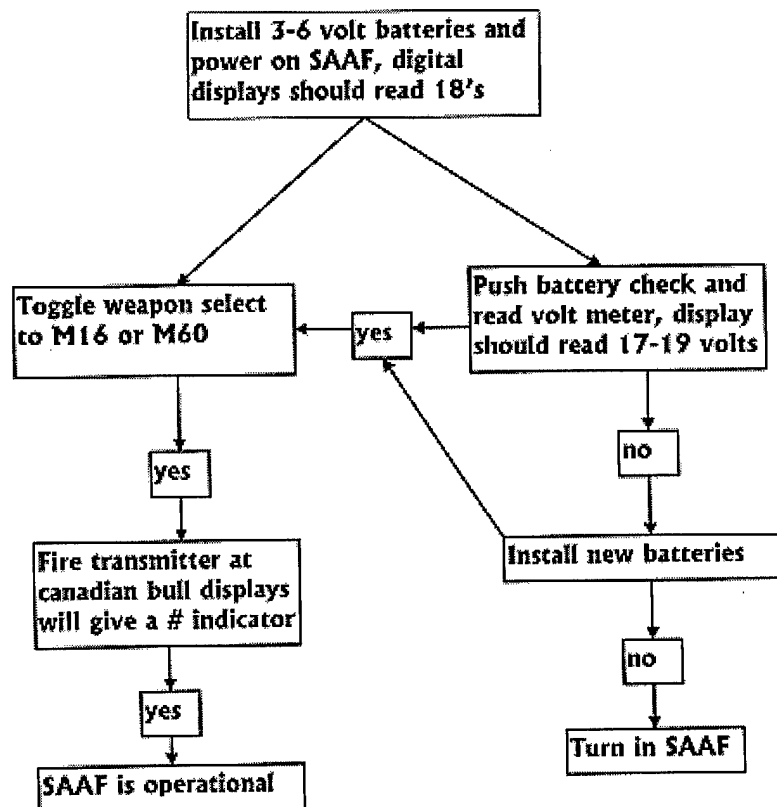


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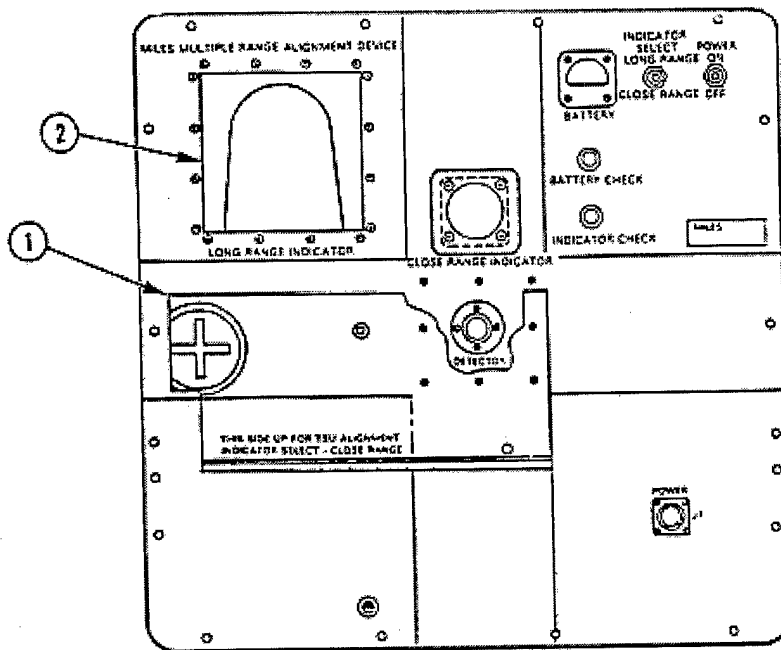
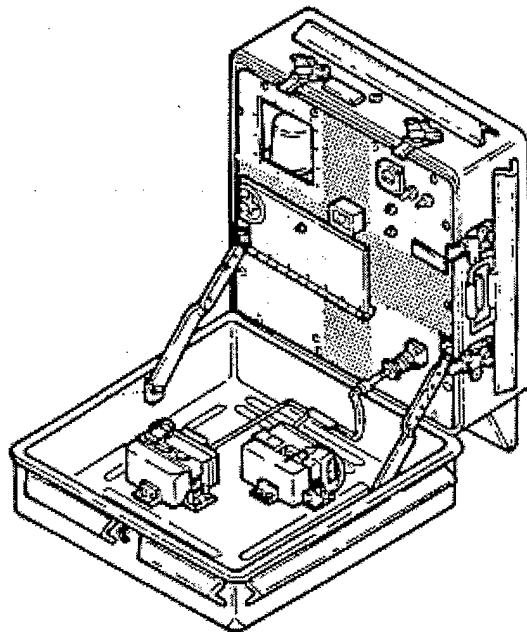
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[Multiple Range Alignment Device \(MRAD\)](#)

MRAD MULTIPLE RANGE ALIGNMENT DEVICE



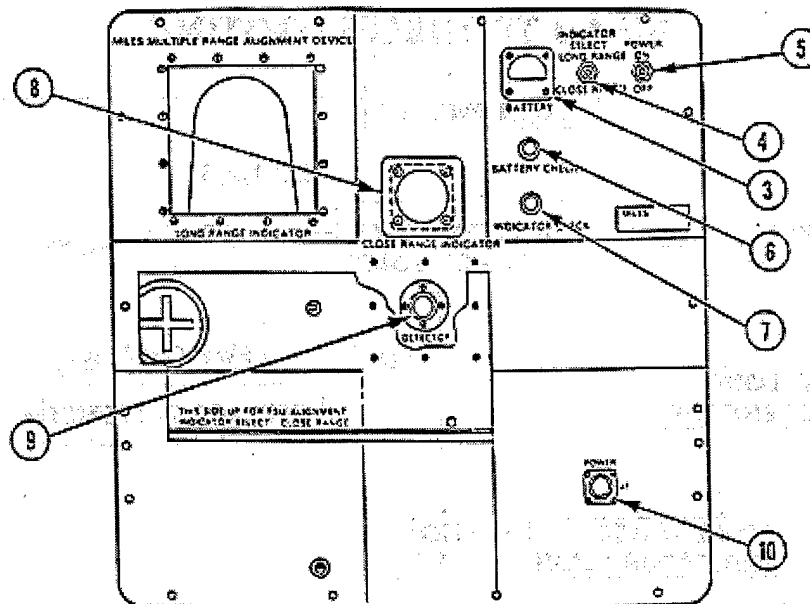
1. HINGED PANEL:

FUNCTION: Adapts device for use with TSU.

OPERATION: UP for TSU, DOWN for all others XMTRS.

2. LONG RANGE INDICATOR (STROBE)

FUNCTION: Verifies boresight at long range.



3. BATTERY METER:

FUNCTION: Indicates battery voltage.

4. INDICATOR SELECT SWITCH:

FUNCTION: Selects either close or long range use.

OPERATION: Close range - TSU

Long range - All other XMTRS.

5. POWER SWITCH:

FUNCTION: Turn system on/off

6. BATTERY CHECK SWITCH:

FUNCTION: Activates voltmeter

OPERATION: Press and hold for ON.

7. INDICATOR CHECK SWITCH:

FUNCTION: Verifies that indicators are operational.

OPERATION: Press for ON.

8. CLOSE RANGE INDICATOR LAMP:

FUNCTION: Verifies boresight at close range.

9. DETECTOR:

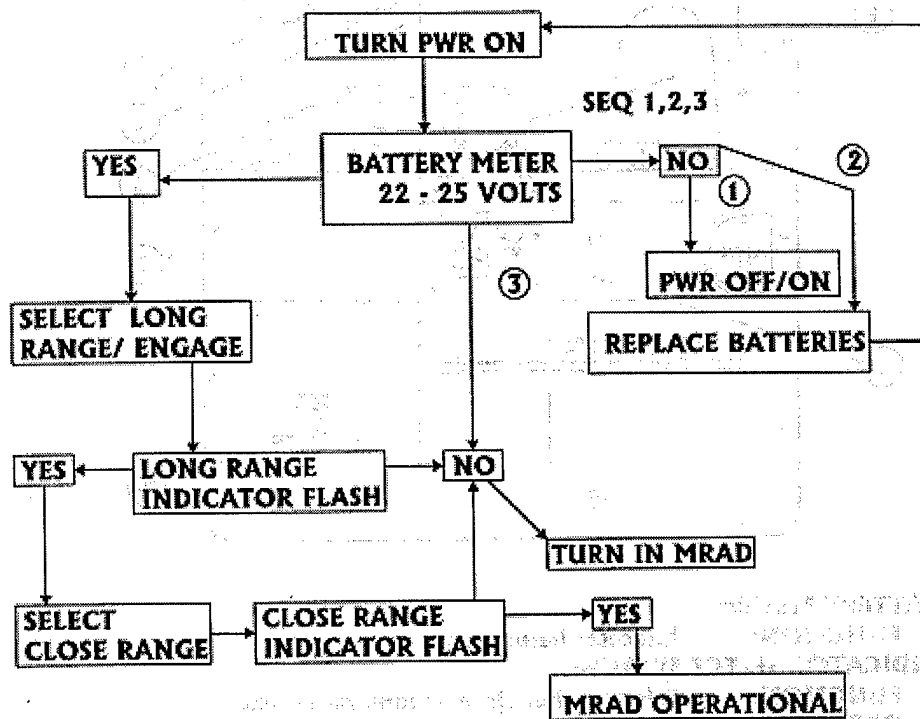
FUNCTION: Receives laser pulses from MILES XMTRS.

10. POWER CONNECTOR J1:

FUNCTION: Provides an input power connection to the alignment device

OPERATION: Install 4-6 volt batteries to battery boxes, using special cable plug to battery box and J1.

MRAD TROUBLESHOOTING



NOTE: USING OPERATIONAL CONTROLLER GUN

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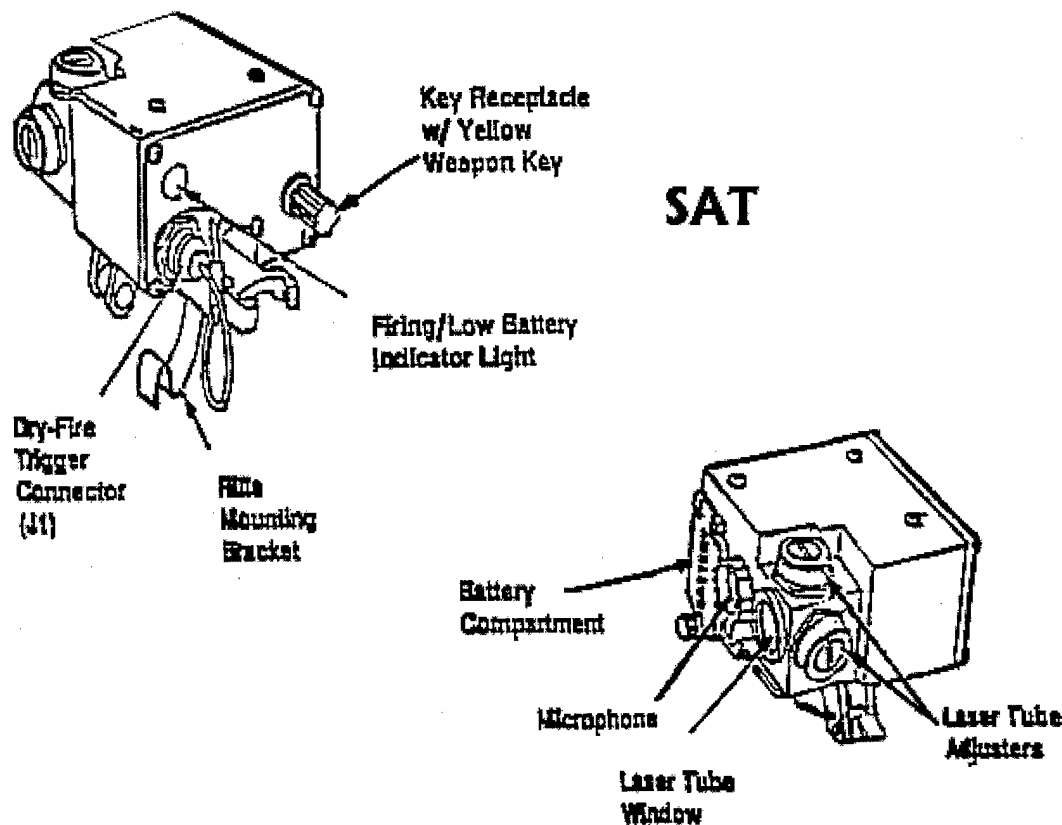
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SMALL ARMS TRANSMITTER

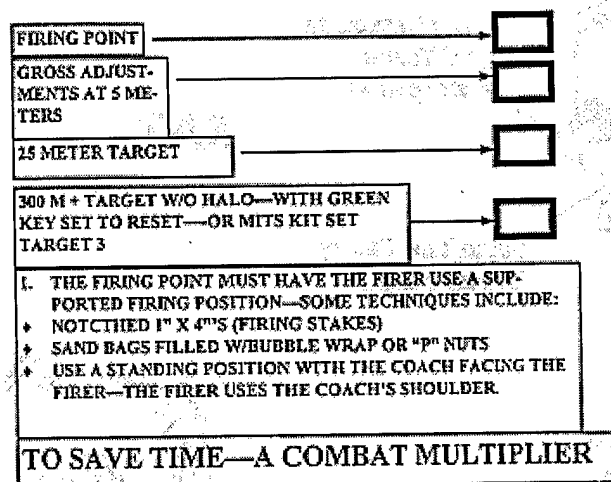


OPERATING PROCEDURES:

1. Insert one 9 volt battery.
2. Insert YELLOW key to ON position. Firing indicator light will flash 2-3 seconds.

SAT/SAF ALIGNMENT USING THE SAAF (Long Range Zero 300 meters)

1. Set up the alignment range.



* From the firing position the soldier makes SAT/SAF GROSS adjustments to either 1's or 0's at the 5 meter SAAF

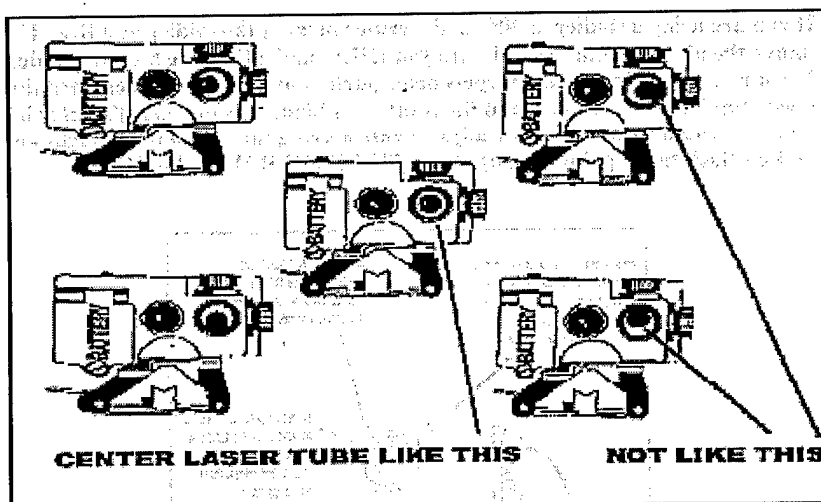
- * The firer moves only his POINT OF AIM - not his body, from the 5 meter to the 25 meter SAAF
- * Always use 3 rounds per adjustments

DIFFERENT TYPES OF TARGETS

- * SAAF - at a minimum use the SAAF at 5 meters with another type of target at 25 meters
- * MITS KIT - use target setting at target type 3 - use just the SDA and ECU
- * LTIDS
- * Individual soldiers with a green key
 - A field expedient technique when all of the above are not available
 - * Use three soldiers at the 5 meter point
 - * Use two soldiers at the 25 meter point
 - * Use one soldier 50 meters plus

2. Install a Dry Fire Cable on the SAT.

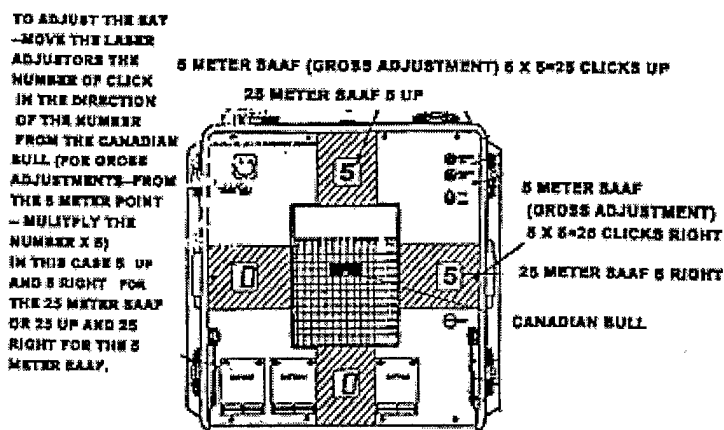
3. Adjust the laser tube.



4. Do a Coarse alignment at 5 meters with the SAAF. Consider spending time at the 5 meter gross adjustment phase. It could save you a lot of time later.

(Although "the Book" says getting the numbers 3 or below is satisfactory, experience has shown that if the gunner has a good stroke and you can get all four Os here with three rounds, you will spend much less time "fine-tuning" the laser at the 25m or 50m + ranges.)

SMALL ARMS ALIGNMENT FIXTURE ASSEMBLY



5. Shift your point of aim to the 25 meters point and zero the SAT. You are zeroed when the SAAF display reads I

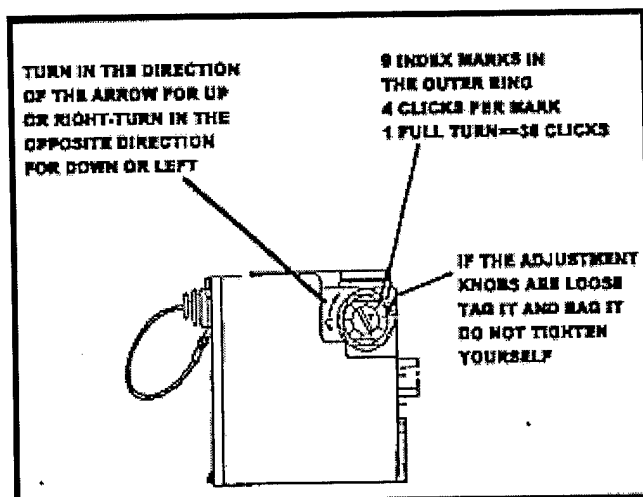
or O (even though "the Book" says 3 or less, this will allow you to quickly zero at a range of 300 meters or more.)

6. Send a soldier with a Torso on only (no halo) and a green key at a range of 300 meters.

7. USE A SUPPORTED FIRING POSITION FOR STABILIZATION.

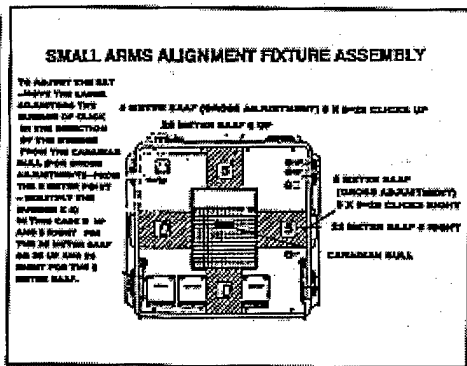
a. If you are using a soldier at 300m, aim center mass of the soldier and fire. If no KILL, move the aiming point around until you KILL, and adjust the SAT as needed.

b. If your point of aim was the target's outer portion of his left shoulder (meaning the laser splash "hit" him in the chest and the front sight blade was the target's outer left shoulder), you would then make SAT adjustments moving the splash to the right and up (moving the splash to the point of aim). NOT THE OTHER WAY AROUND.



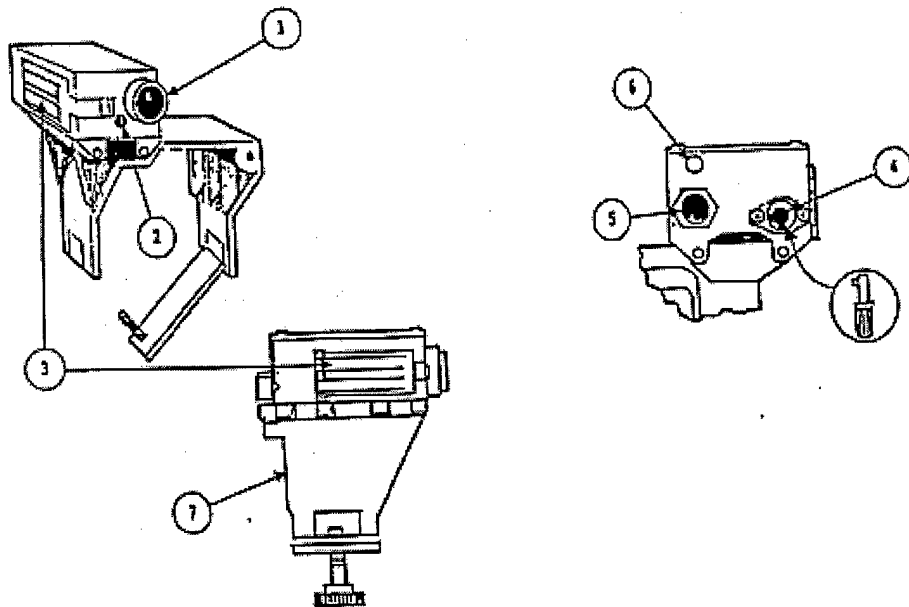
8. After a KILL, move the Laser Tube adjuster up two clicks at a time until you have a miss (keep count of how many clicks up).
9. After you have a miss, move the Laser Tube adjuster back down to your start point. Keep going down until you have a miss (keep count of the total number of clicks). Divide the total number by 2 (Example: 10 divided by 2=5), and move the Laser Tube adjuster back up that amount.
10. Aim center mass of the soldier and fire. You should have a KILL.
11. After a KILL, move the Laser Tube adjuster right 2 clicks at a time until you have a miss (keep count of how many clicks right).
12. After you have a miss, move the Laser Tube adjuster back to your start point. Keep going left until you have a miss (keep count of the total number of clicks). Divide the total number by 2 (Example: 12 divided by 2=6), and move the Laser Tube adjuster back to the right that amount.
13. Aim center mass of the soldier and fire. You should have a KILL. You are now zeroed.

SAT/SAW



.50 CAL MG

M2 .50 Cal. MG Laser XMTR



COMPONENTS:

1. XMTR Lens.
2. Acoustical microphone.
3. Battery compartment.
4. Weapons key receptacle.
5. Dry fire cable receptacle.
6. Firing indicator.
7. Mounting bracket.

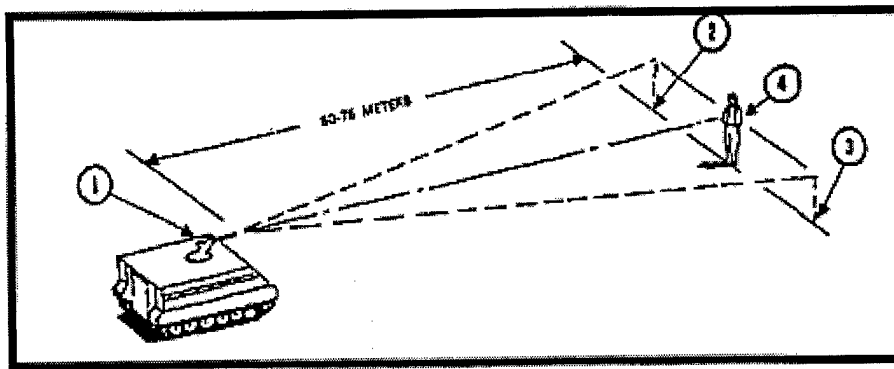
OPERATING PROCEDURES:

1. Install 1-9 volt battery.
2. Insert orange weapon key.

ALIGN M2 50 CAL WITH A VEHICLE MOUNT

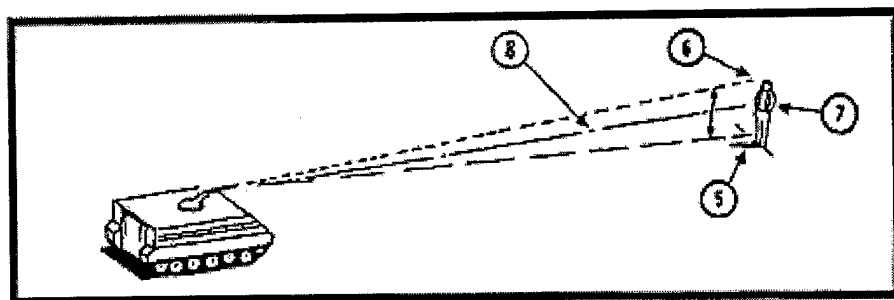
1. Set sights to zero windage, 500 range, rear leaf sight up. Shift gun until target man receives "Near Miss" signal (Target man has a MWLD w/o HALO and a green key in the reset position).

ENSURE TRANSMITTER IS "GREEN KEYED" AND THEN ORANGE KEYED FOR DRY FIRE. PRESS DRY FIRE TRIGGER TO SEE IF FIRING LIGHT INDICATOR IS WORKING.



THEN HOLD THE GUN IN THAT POSITION. DO NOT MOVE THE GUN.

2. Move target man away from you until there is no target effect. Have him mark the ground and move to starting point.
3. Move target man towards you until there is no target effect. Have him mark the ground.
4. Center target man between both points.



5. Continue to hold gun in position and adjust sights elevation (range) sights onto target man.
6. **DO NOT MOVE THE GUN.** Have the target man move to the right until there is no target effect. Have him mark the spot and move to starting point.
7. **DO NOT MOVE THE GUN.** Have the target man move to the left until there is no near miss tone. Have him mark the spot and move to the center of both marks.
8. **THIS IS THE MEAN POINT OF IMPACT.** Move your windage adjustment to the center of his chest. Always fire a belt of blank rounds to verify the transmitter is emitting the hit words.

M-2 MACHINE GUN

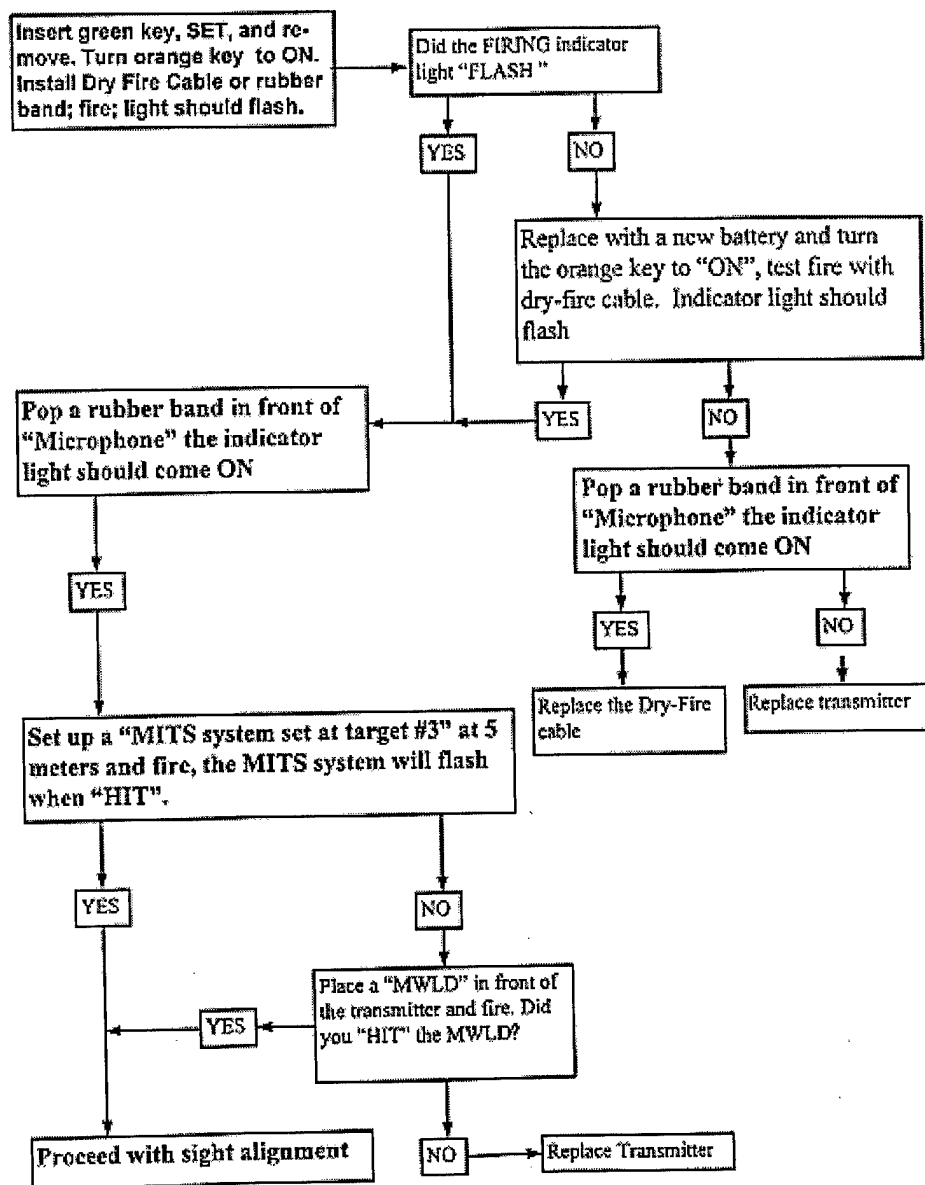


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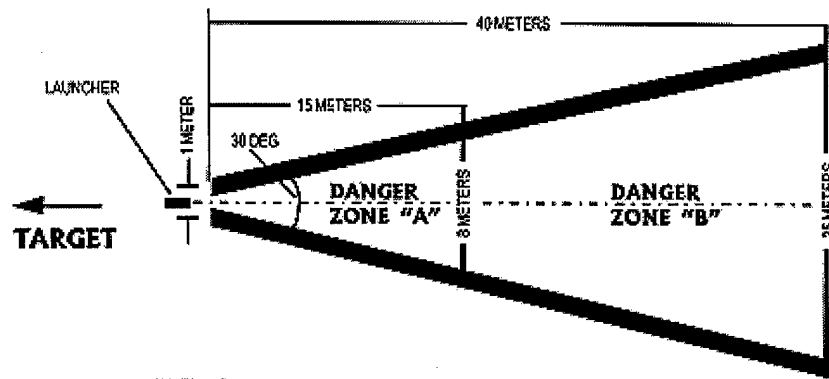
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[ATWESS Safety Message](#)

SAFETY ATWESS FIRING DEVICES



WARNING
DO NOT FIRE UNLESS...
1. Back blast area is clear of personnel and obstructions.
2. Body extremities are clear of Rocket exhaust end.

ZONE "A" DANGER IN THIS AREA FROM BLAST, HEAT, AND PROJECTED MATERIALS.

ZONE "B" DANGER IN THIS AREA FROM PROJECTED MATERIALS.

WARNING

NEVER ARM AN ATWESS UNTIL YOU ARE READY TO FIRE.

TREAT THE DEVICE AS YOU WOULD ANY LOADED AND ARMED WEAPON. DO NOT DROP DEVICE WHEN ATWESS IS LOADED AND ARMED.

HANDLE ATWESS CARTRIDGES WITH THE SAME CARE YOU USE WITH ANY LIVE AMMUNITION.

ALWAYS WEAR EARPLUGS WHEN FIRING ATWESS DEVICES.

BEFORE INSTALLING ATWESS INTO A DEVICE, INSURE FIRING PIN IS DEPRESSED IN ITS CHAMBER.

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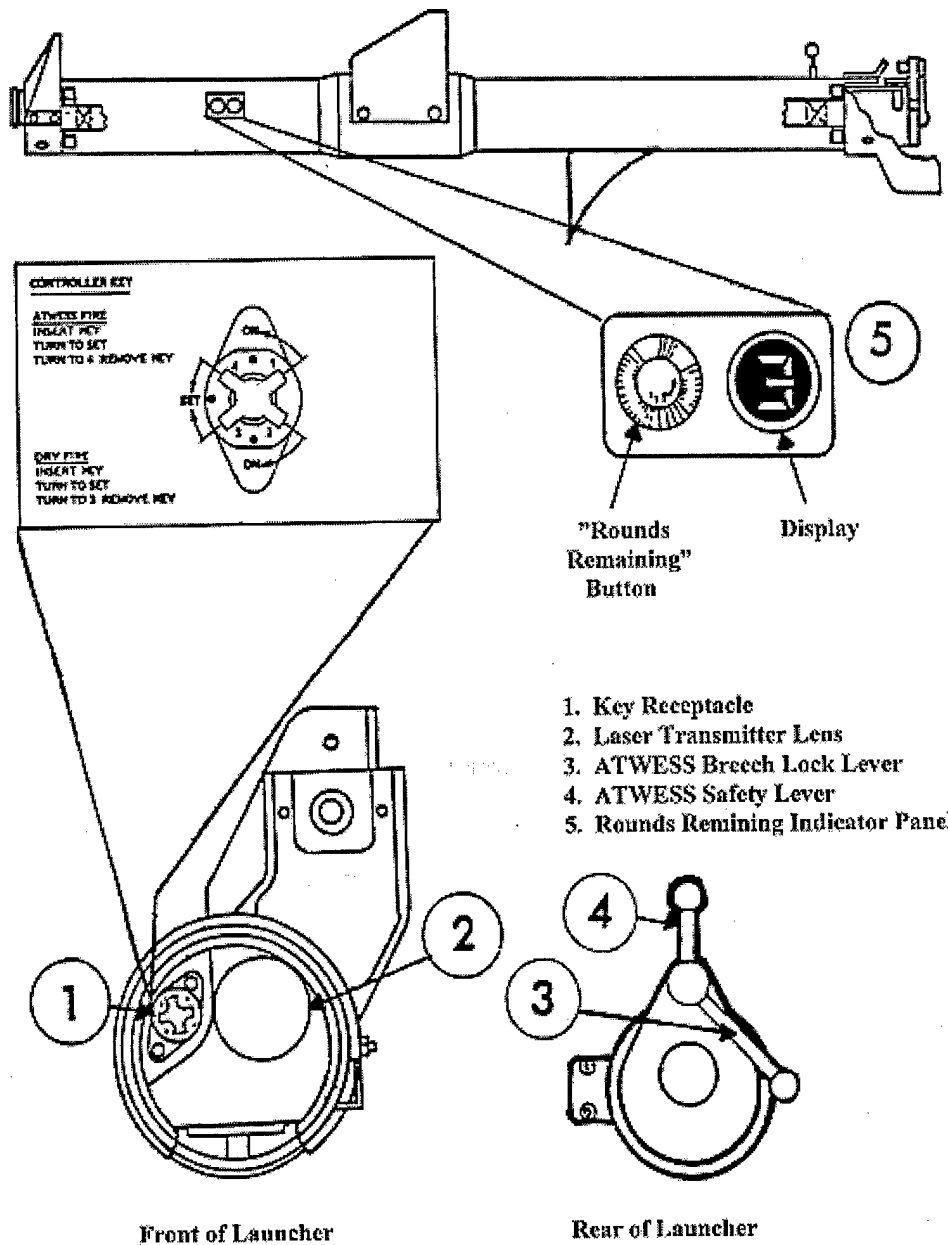
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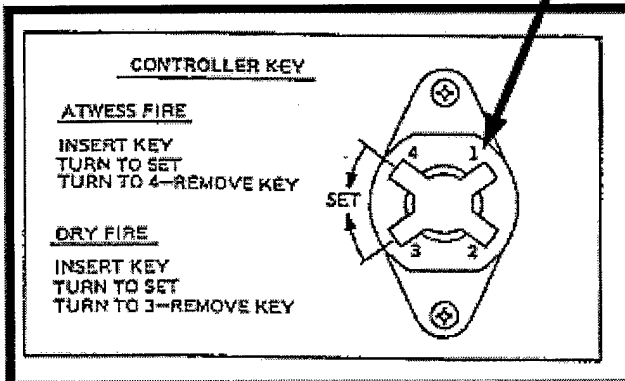
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COMPONENTS

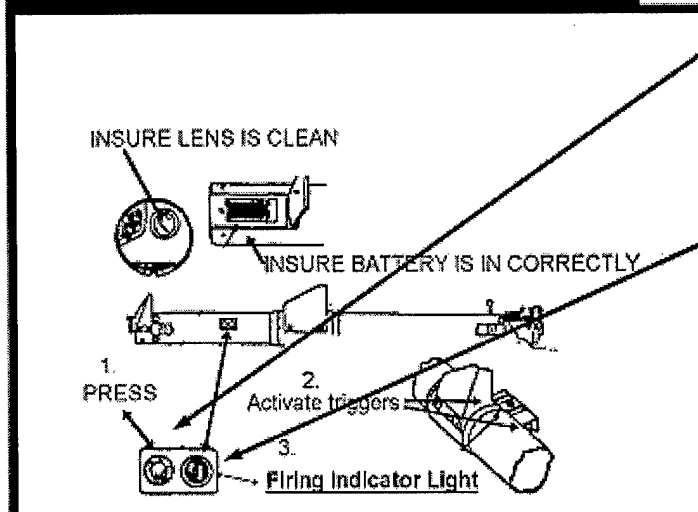


PLACE MILES VIPER INTO OPERATION WPN (YELLOW) KEY IS NOT USED TO TURN ON THE VIPER

1. Insert BA3090/U 9-Volt Battery



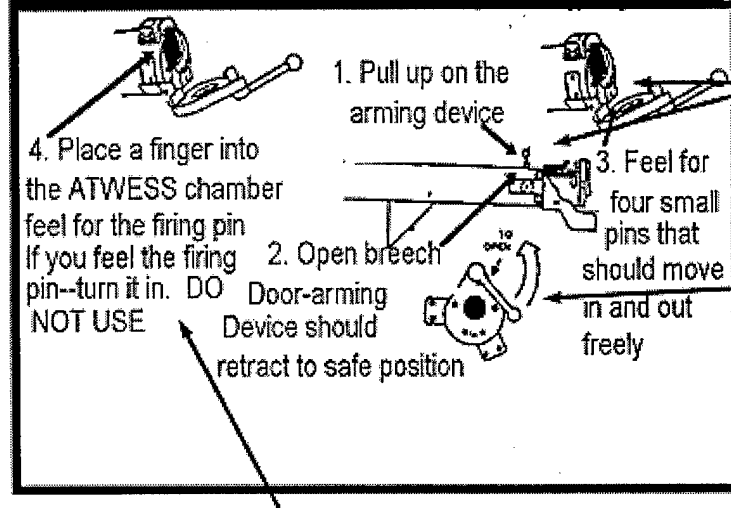
2. Set MILES Viper to DRY-FIRE with Controller's Key. (Insert key, turn it to SET, turn it to "3," remove key.)



3. Press Rounds Remaining Display (1) Button. To ensure you obtain a "4" in the Rounds Remaining Display (see FLOW CHART for trouble shooting procedures).

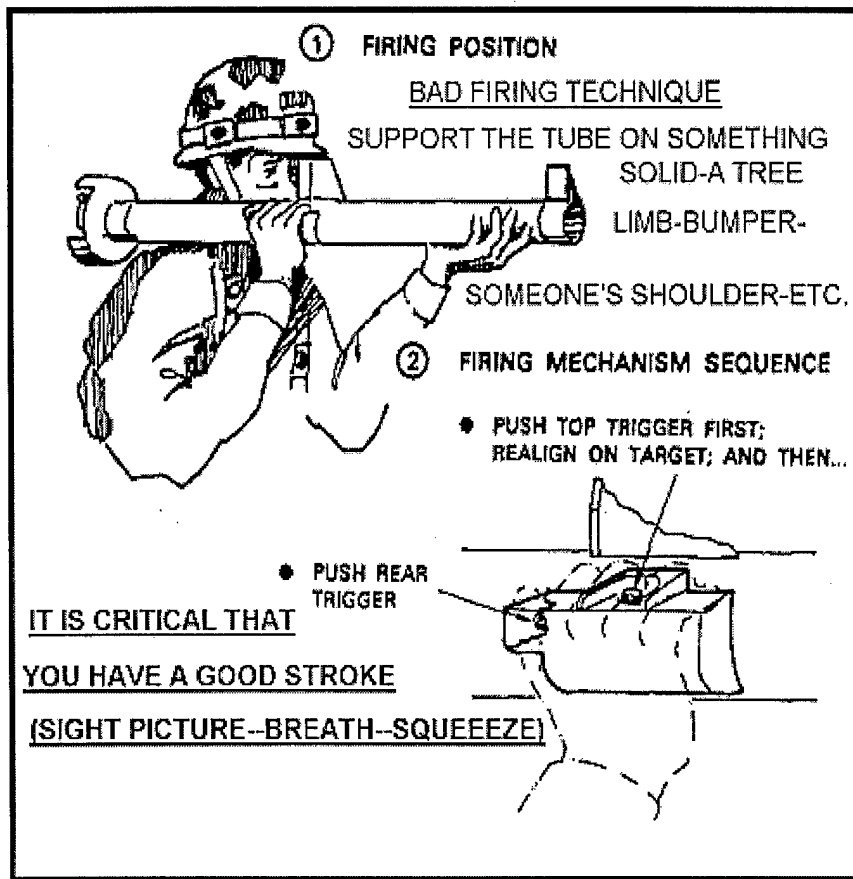
4. Once you have verified your rounds—ACTIVATE TRIGGERS (2) and CHECK TO INSURE THE FIRING INDICATOR BLINKS (3) WHEN THE TRIGGERS ARE DEPRESSED

CHECK ALL ATWESS CHAMBERS.

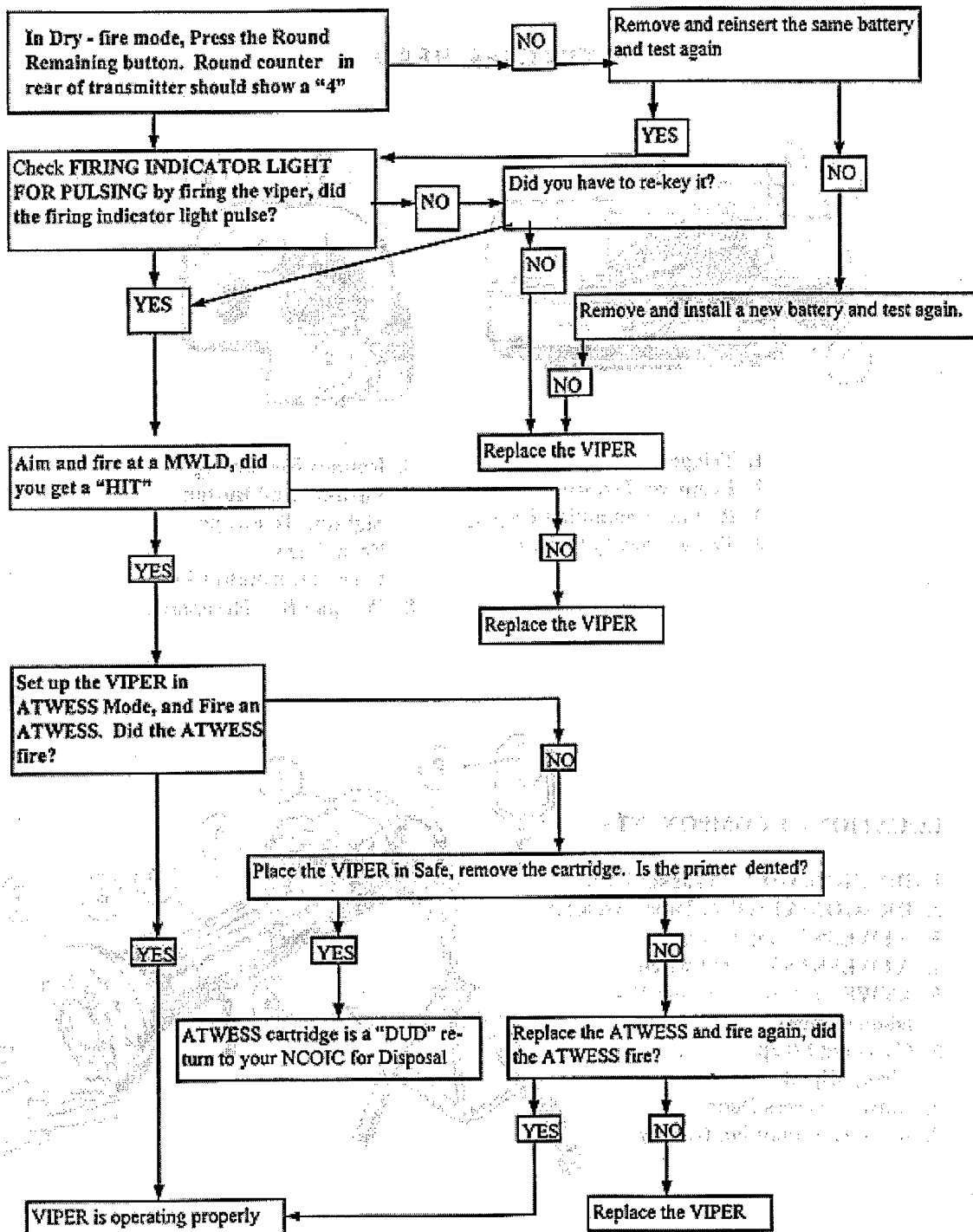


Pull up on the Arming Device (1) until it locks in place. Open the breech door and the Arming Device should retract down to the Safe position (2) if it doesn't, turn it in--DO NOT USE. Feel on the breech door for 4 small pins that should move in and out freely (3). Place a finger into the ATWESS chamber and feel to see if the FIRING PIN is protruding (4) IF IT IS, TURN IT IN. DO NOT USE.

MILES VIPER FIRING PROCEDURES



VIPER SYSTEM



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[ATWESS Safety Message](#)

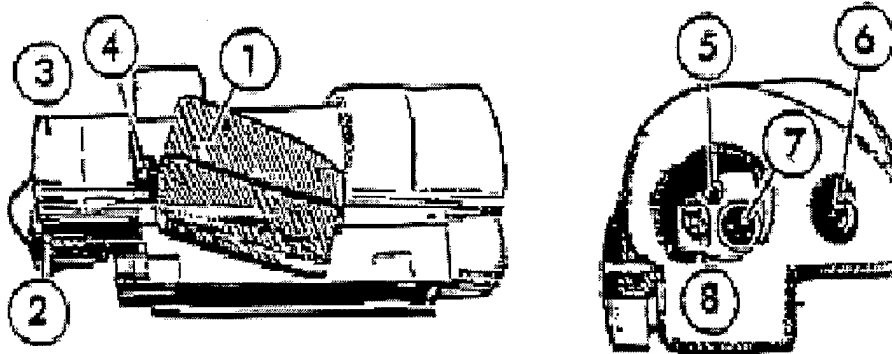
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DRAGON

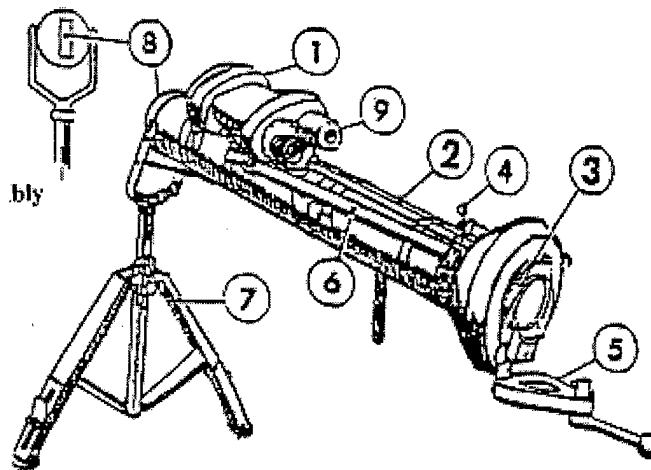
COMPONENTS

TRACKER HEAD



1. Trigger
2. Eyepiece, Telescope
3. Rounds Remaining Display
4. Trigger Safety Switch
5. Rounds Remaining Push-to Read Button
6. Sighting Telescope, Front View
7. Laser Transmitter Lens
8. Weapons Key Receptacle

LOCATION OF COMPONENTS

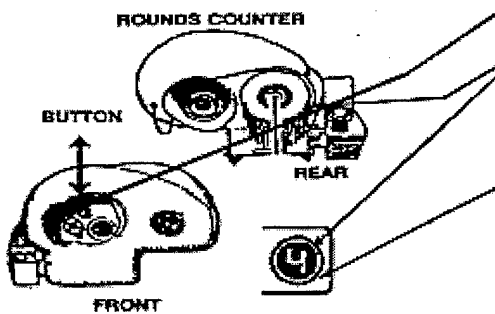
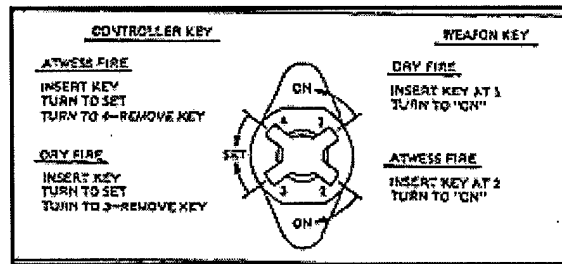


1. DRAGON/MILES Tracker Head
2. DRAGON/ATWESS Tube Assembly
3. ATWESS Firing Device
4. ATWESS Safe/Arm Switch
5. ATWESS Breech Closure Door (shown open)
6. Carrying Strap
7. Firing Bipod
8. Battery Access Door
9. Rounds Remaining Display

PLACE MILES DRAGON INTO OPERATION

The MILES DRAGON is placed into operation in an almost identical manner to the MILES Viper.

1. After inserting and checking the battery and setting the device to dry-fire with a controller key, insert a yellow key. Depending on whether the device is set for dry or ATWESS firing, the yellow key can only be inserted in one position and turned in one direction.



2. Push the Round Counter Button and look in the Rounds Display Window to make sure "4" rounds are indicated.

3. CHECK THE FIRING INDICATOR LIGHT BY DEPRESSING THE SAFETY AND FIRING TRIGGER AND WATCHING FOR THE PULSING FIRING INDICATOR LIGHT BY THE ROUNDS COUNT INDICATOR.

4. Reset the device with the controller key to ATWESS fire and re-insert the yellow key. The MILES Dragon is now ready to operate.

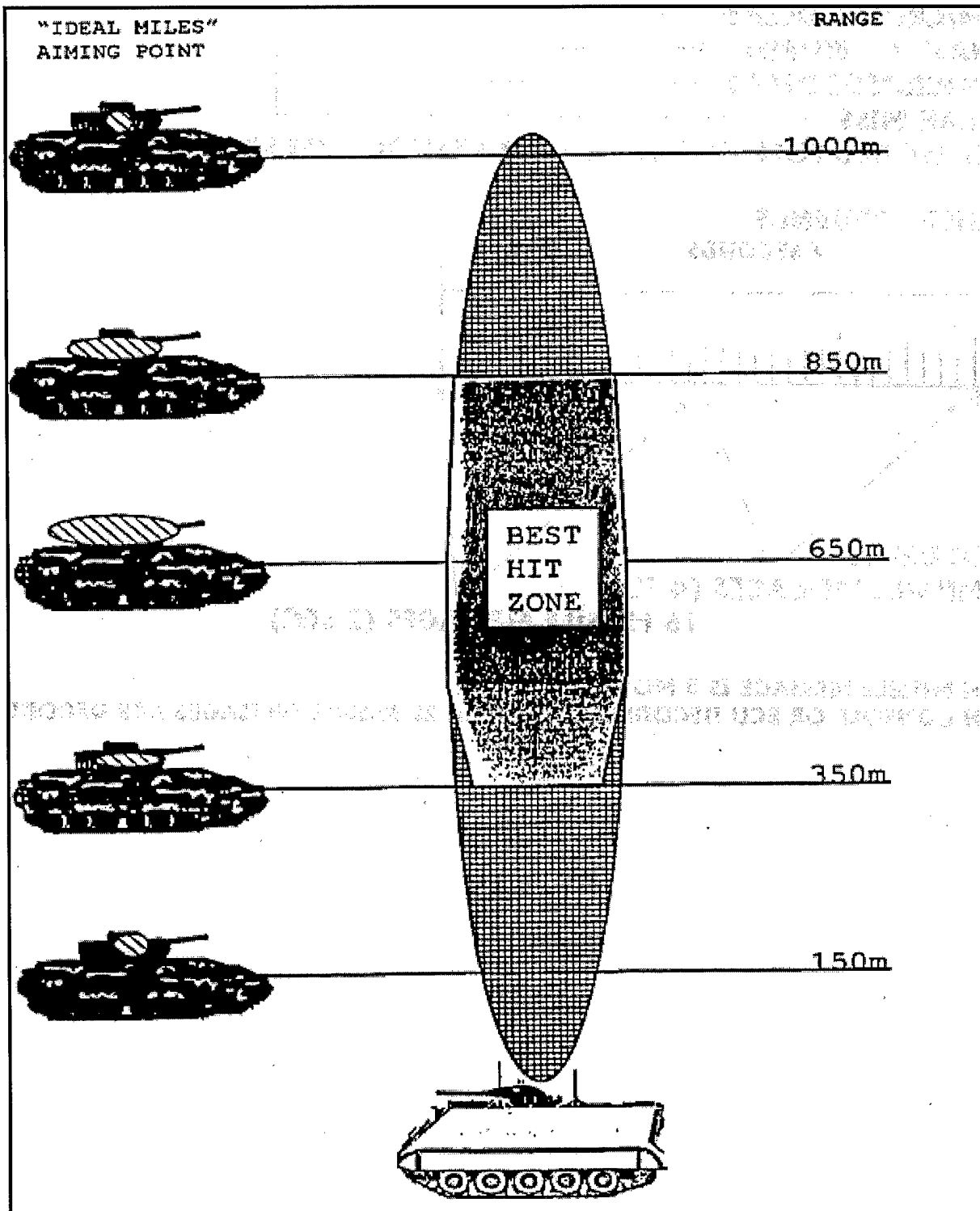
The pulses that you see are the MISSILE HIT Messages and Hit words. A target that will decode the MISSILE HIT Messages must collect at least 22 of 32 missile hit Messages before it will allow the PK Boolean Decoding Wheel (in the console) to decide if the target will be a catastrophic kill, hit with no effects, or a hit with effects. The most critical time when tracking (as with a real missile) is the last 4 seconds.

DRAGON FIRING PROCEDURES

1. Move Breech Lock Lever to OPEN position
2. Open Breech Door
3. Insert ATWESS cartridge into Breech
4. Close Breech Door
5. Move Breech Lock Lever to CLOSED position
6. Take up a stable firing position
7. Pull Safety Lever to ARMED position
8. Acquire the target
9. Fire the DRAGON and track target
10. Press Push-to-Read Button
11. Check Rounds Remaining
12. Observe Rounds Counter in Tracker Head

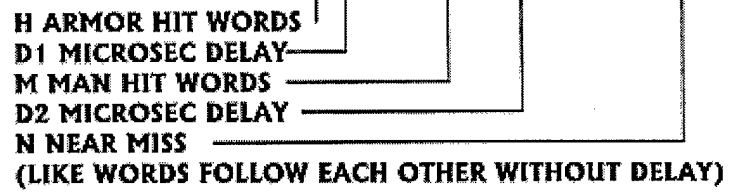
DRAGON MILES AIMING POINTS

Verified by:
1/4 Inf (OPFOR) CMTC
STRICOM

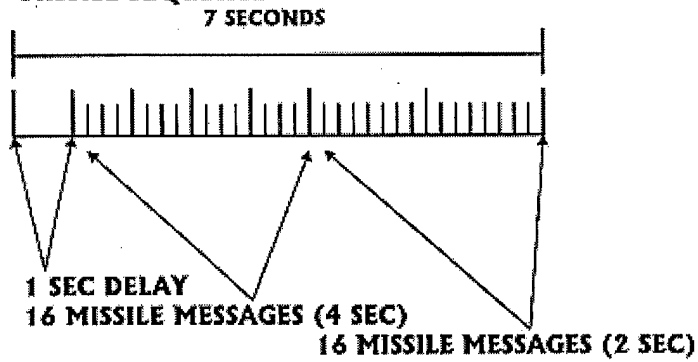


DRAGON MILES MESSAGE COMPONENTS

MESSAGE



MISSILE SEQUENCE



EACH MISSILE MESSAGE IS 8 MISSILE WORDS

EACH CONSOLE OR ECU DECODES A HIT AFTER 22 MISSILE MESSAGES ARE DECODED

DRAGON SYSTEM

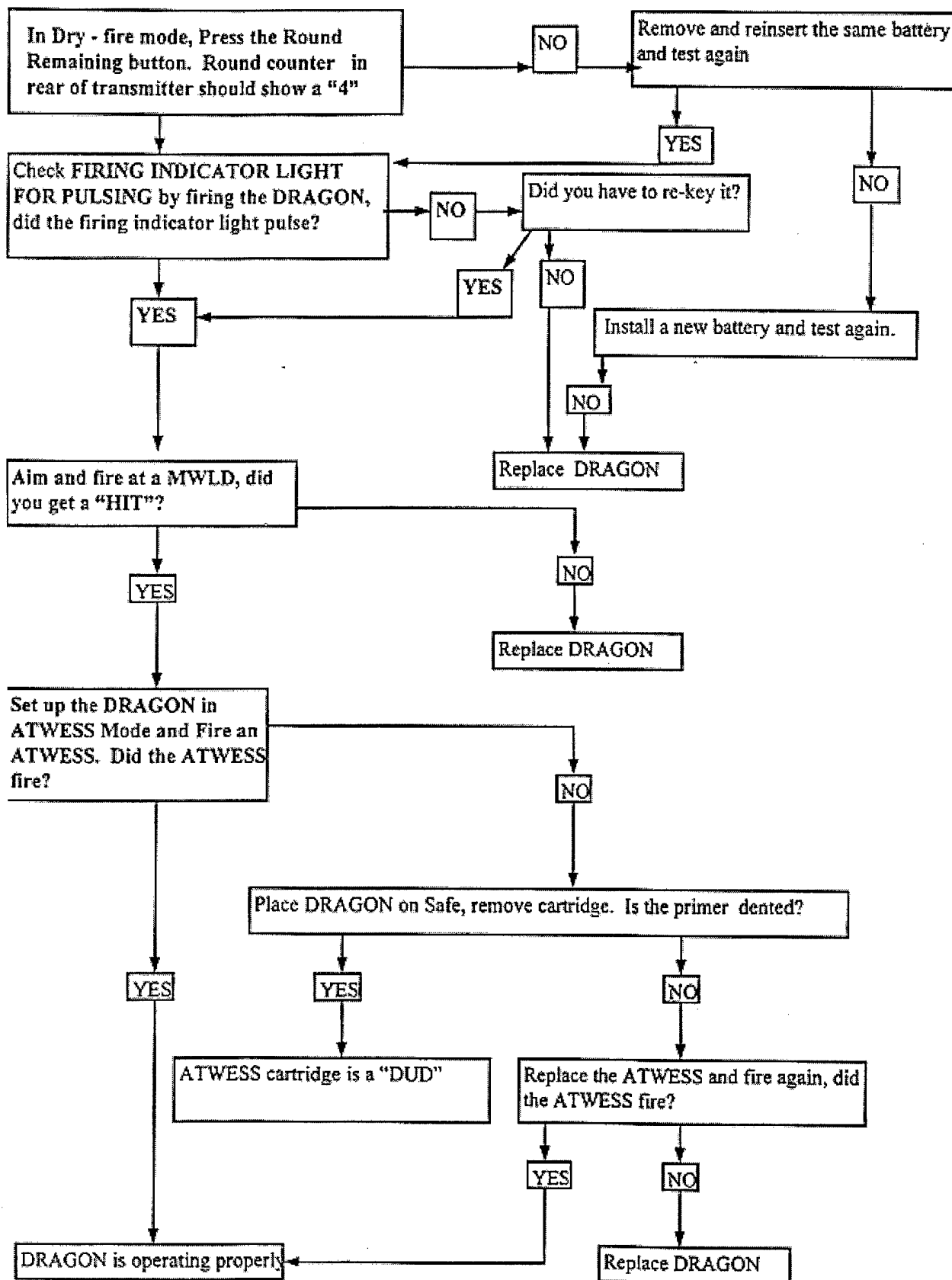


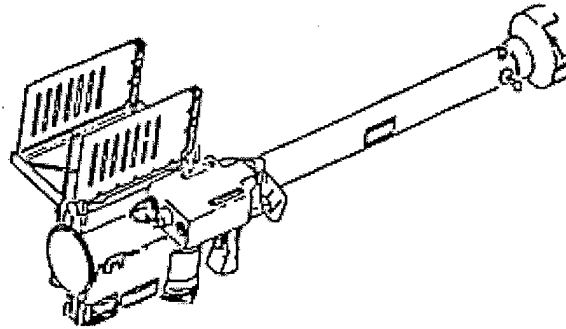
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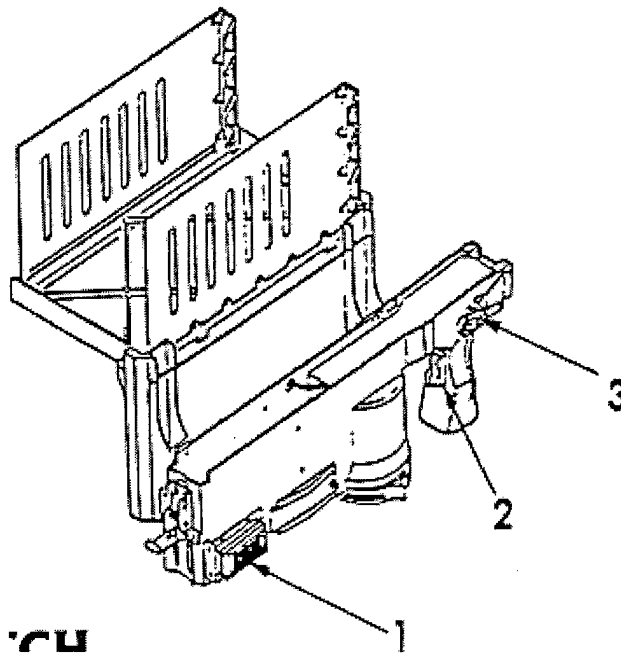
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STINGER

COMPONENTS

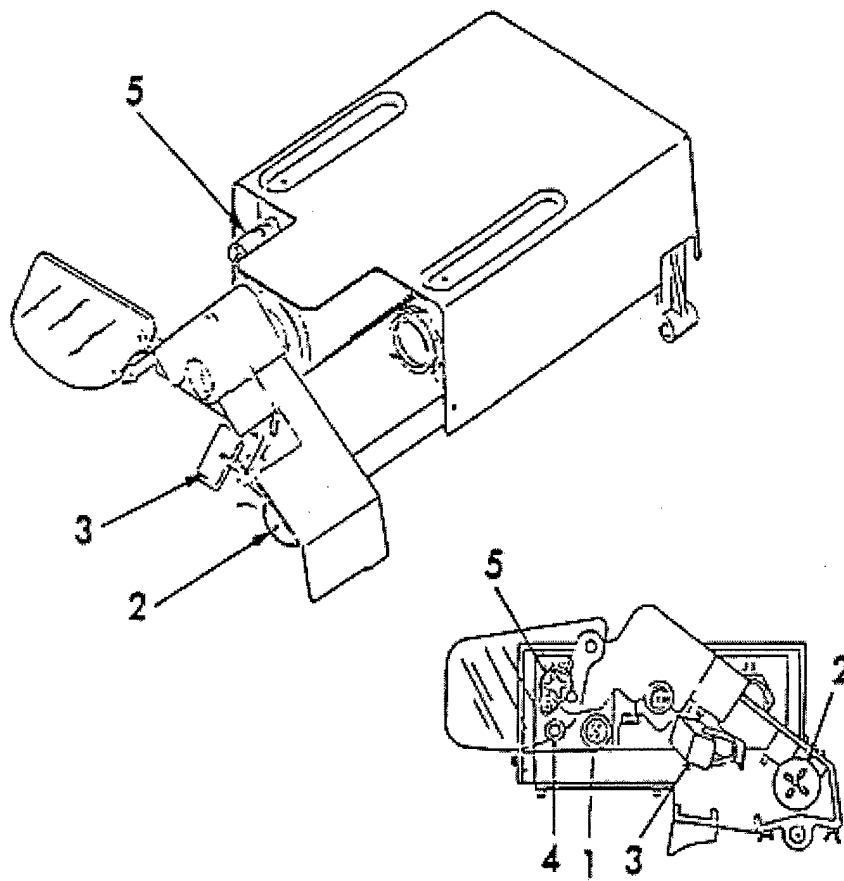


GRIPSTOCK ASSY.



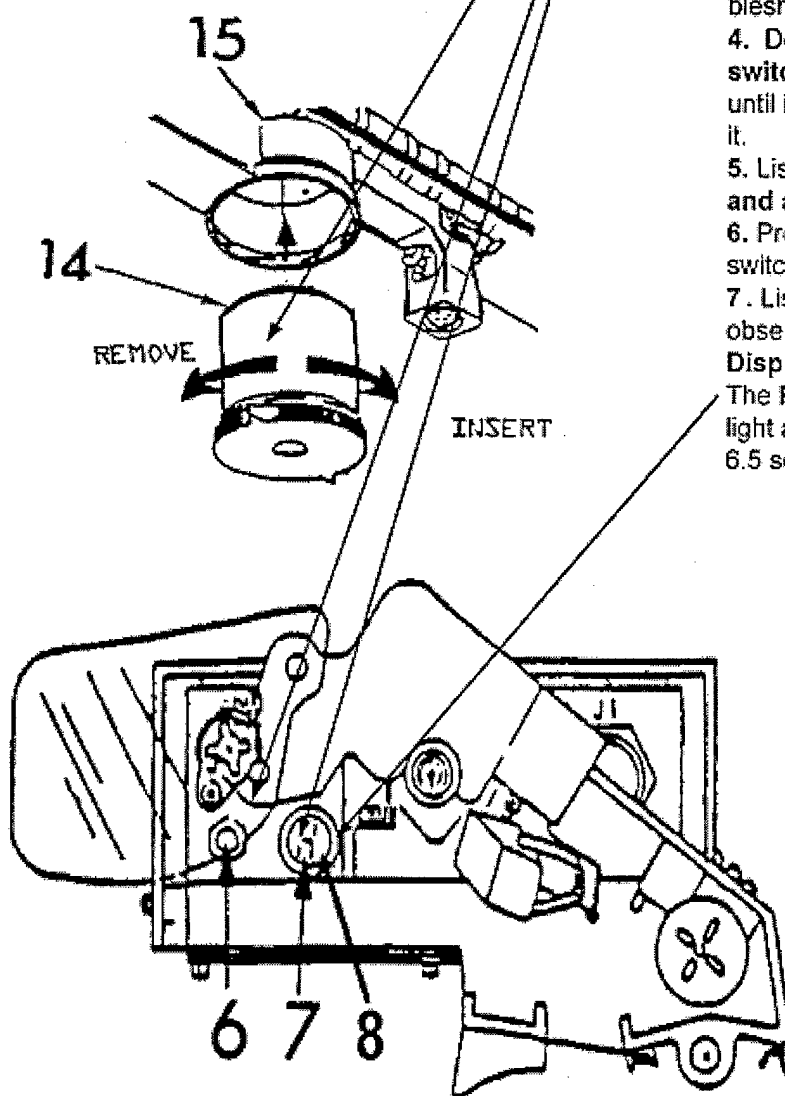
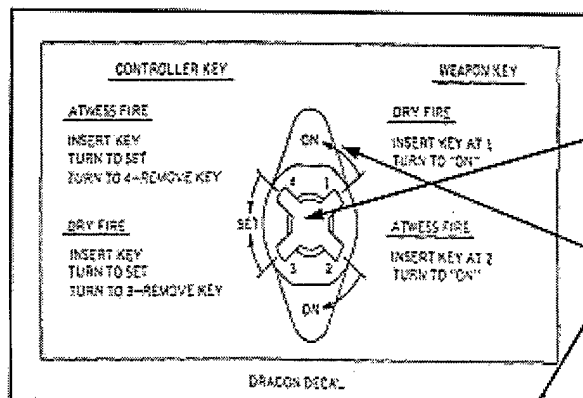
1. UNCAGING SWITCH
2. TRIGGER
3. SAFETY AND ACTUATOR DEVICE

TRANSMITTER ASSEMBLY

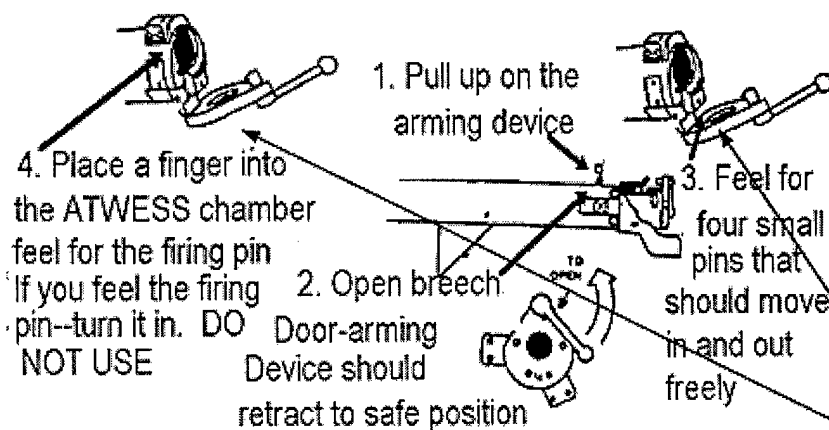


1. DISPLAY
2. LOUDSPEAKER
3. BONE VIBRATOR
4. PUSH TO RED BUTTON
5. KEY RECEPTACLE

PLACE STINGER INTO OPERATION



1. Insert BA30390/u 9-volt battery
2. Press Rounds Remaining Display Button--It should be blank.
3. **SET UP MILES STINGER TO DRY FIRE WITH THE GREEN (CONTROLLER'S KEY).**
 - A Turn the green key SET.
 - B Turn the green key to 3.
 - C Remove the green key.
 - D Insert the WPN (Yellow) into slot 1 and Turn it on".
 - E Remove the MILES BCU dummy battery (14-15) and Re-install.
 - F Press Rounds Remaining Display Button (6). You should have 6 in the Rounds Remaining Display Window. (If 6 is not displayed use troubleshooting flow chart).
4. Depress the safety and actuator switch by rotating it out and forward until it activates (clicks) then release it.
5. Listen for the gyro spin-up tone and a distinctive acquisition tone
6. Press and hold the uncaging switch.
7. Listen for the uncaging tone and observe the Rounds Remaining Display and squeeze the trigger. The Firing Indicator Light (8) should light and remain on for approximately 6.5 seconds. The trigger should return to its original position when released.
- 8 Press the Rounds Remaining Display Button—you should now have 5 rounds.
- 9 Remove and Re-install the MILES BCU dummy battery. **THE MILES BCU DUMMY BATTERY MUST BE REMOVED AND RE-INSTALLED AFTER EACH ROUND IS FIRED OR IF THE 47 SECOND TIME PERIOD HAS ELAPSED.**



INITIAL ATWESS CHAMBER CHECKS

1. Pull up on the **Safe/Arm Shaft** until it locks into place. Open the breech door and the **SAFE/ARM SHAFT** should retract down to the safe position (2) **IF IT DOESN'T--TURN IT IN. DO NOT USE.**
2. Feel on the breech door for 4 small pins that should move freely in and out (3).
3. Place a finger **INTO** the ATWESS Chamber and feel to see if the **FIRING PIN IS PROTRUDING** (4) **IF IT IS--TURN IT IN--DO NOT USE.**

YOU ARE NOW READY TO TEST THE STINGER IN THE DRY FIRE MODE.

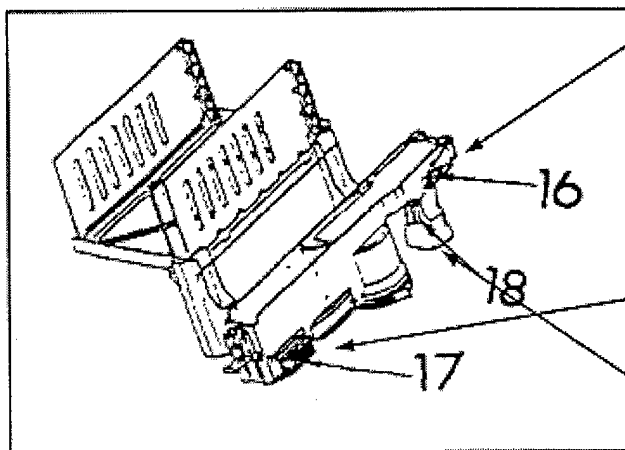
1 Activating the Stinger in the Dry Fire Mode.

A Have a target (MILES up aircraft or the MILES 1 MITS KIT set at Target Type 3.)

B Go through your firing sequence (Steps 3-9 above)

(1) Insure you have removed and re-installed the MILES BCU dummy battery.

(2) Press the Rounds Remaining Display Button--You should have 5.



(3) Depress the **safety and actuator switch (16)** by rotating it out and forward until it activates (clicks), then release it.

(4) After pushing the **actuator switch a "spin-up" tone** will be audible for one second. This will be followed by a **"caged non-acquisition" tone**. This initial two-second period following activation is warm-up time and no other switch or operations are required during this period. The **gyro uncage switch (17)** may be activated anytime after the first 2 seconds and before the second activation period has ended.

(5) The **Stinger trigger** must be pressed at the same time the uncage switch is activated and/or before the 47 secs. activation period has ended.

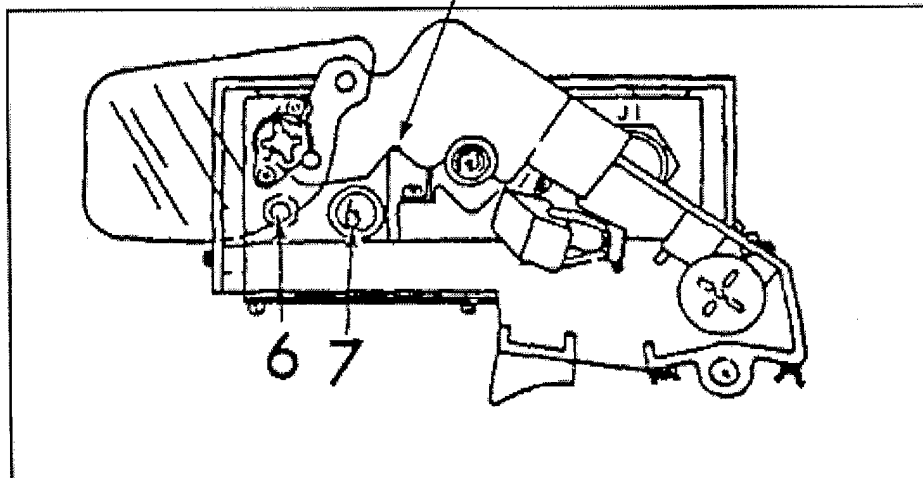
All audio tones (except the ATWESS mode) cease when the trigger is pressed.

(6) Listen for the gyro spin-up tone and a distinctive acquisition tone.

(7) Press and hold the uncaging switch (17)

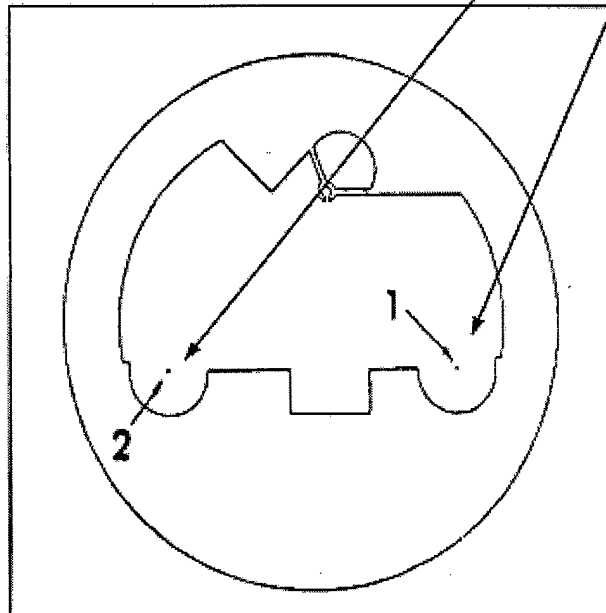
(8) Listen for the uncaging tone.

(9) Acquire the



Target by placing either **Lead 1** or **2** on the targets sensor system.

(10) Both left and right reticles contain small dots (1 and 2) at their centers. The two laser tubes have been factory aligned to these dots. When you apply superelevation and lead to the MILES Stinger, ensure that one of these dots remains centered on the target. After squeezing the trigger, keep the reticles dot centered on the target for the duration of the laser firing (approximately 6.5 seconds). You are **NOT TRACKING** the target. You are insuring enough **HIT WORDS** will be decoded by the targets detection system to **KILL** the target.



(11) YOU HAVE 47 SECONDS TO ACQUIRE AND HIT THE TARGET. THE TIME STARTS FROM WHEN YOU DEPRESS THE SAFETY AND ACTUATOR SWITCH. IF YOU DO NOT FIRE THE STINGER WITH THE 47 SECONDS THE STINGER WILL DEACTIVATE.

(12) Once you acquire the target and have placed either lead 1 or 2 on the target, **DEPRESS the trigger**. You should see the targets light blink

- (a) 2-4 times--NEAR MISS
- (b) 4-6 times--HIT WITH NO EFFECTS
- (c) Continuous--CATASTROPHIC KILL.

(13) Check your round count--you should have 4.

(14) Remove and re-install the MILES BCU dummy battery

(15) You have verified the Stinger in Dry

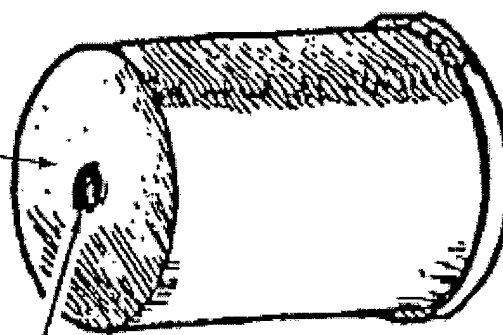
Fire Mode.

ACTIVATE THE STINGER IN THE ATWESS MODE

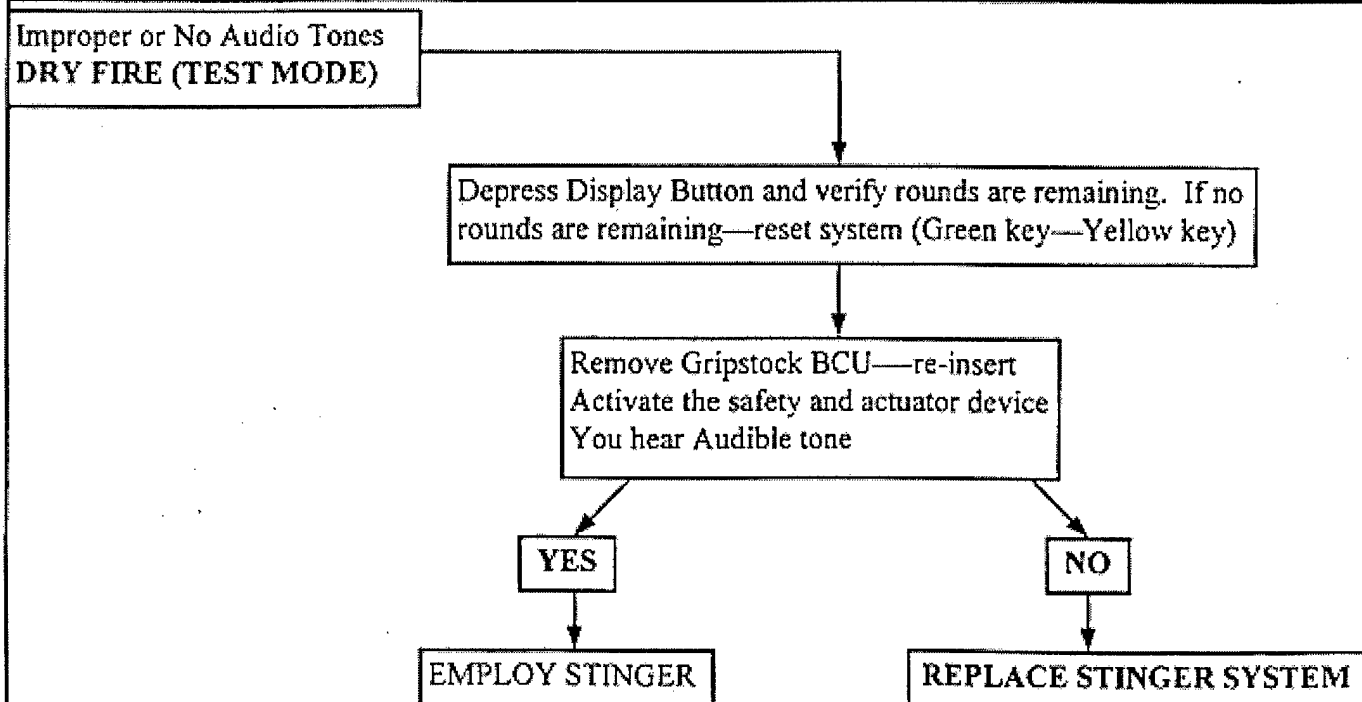
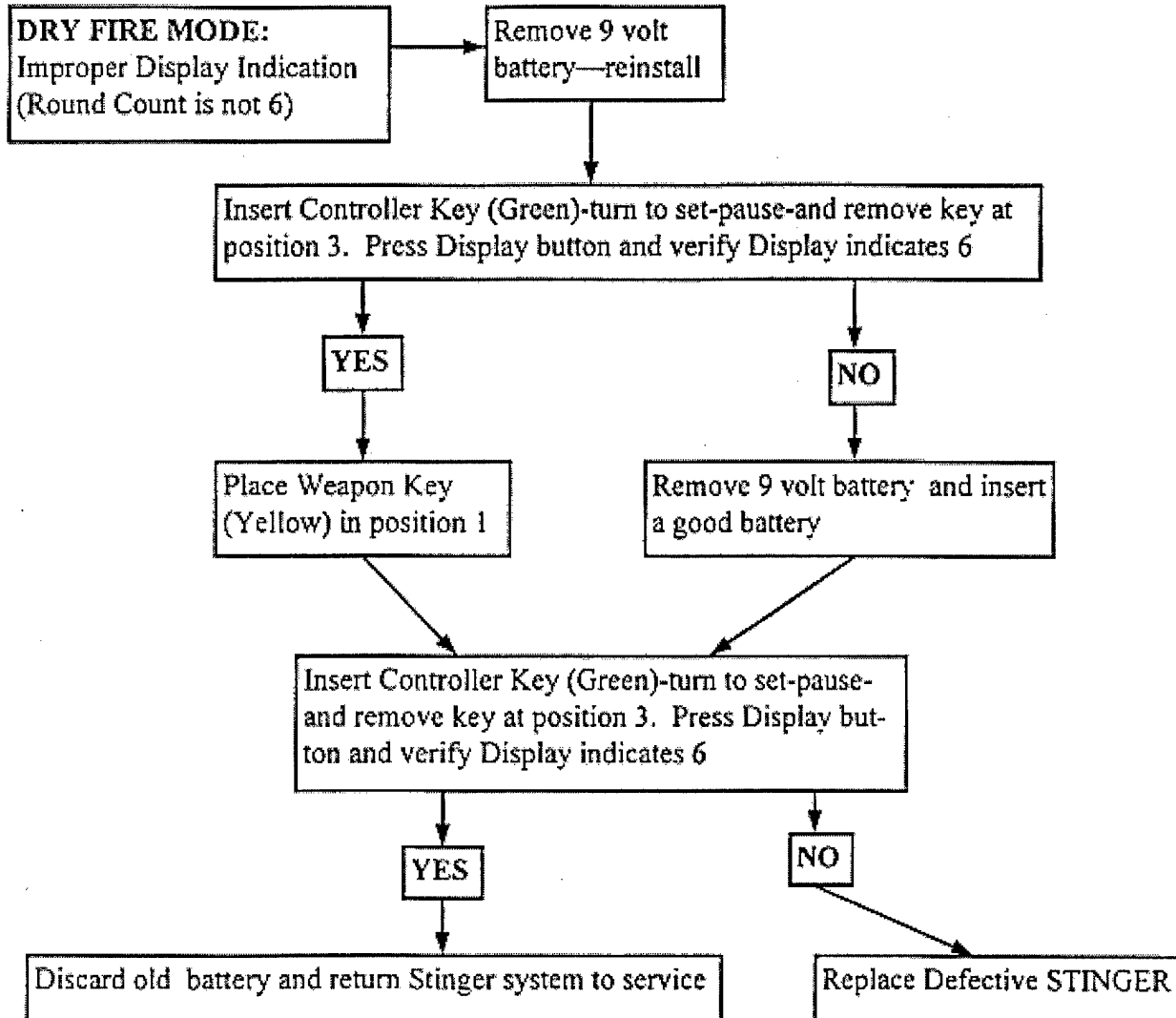
- 1 Have the controller **SET** the Stinger to the ATWESS mode by placing the green key in the key receptacle and turning it to **SET**.
- 2 The controller must bring the key out at position 4.
- 3 Place the WPN (YELLOW) key in at the 2 position and "turn on".
- 4 Do not load the ATWESS until you have selected a target and are preparing to fire. Do not stand behind the ATWESS when loading. Do not place your hand in front of the breech door.
- 5 Place the ATWESS round in the chamber and close and lock the breech door.
- 6 Arm the Stinger by pulling the **SAFE/ARM** shaft up until it locks.
- 7 Perform your Firing sequences as you did when **DRY FIRING**.
- 8 when your firing is complete remove and re-install the MILES BCU dummy battery. This must be accomplished after each round is fired.
- 9 Remove the spent cartridge from the ATWESS.
- 10 **IF THE ATWESS CARTRIDGE DOES NOT FIRE--CHECK THE CARTRIDGE PRIMER.**

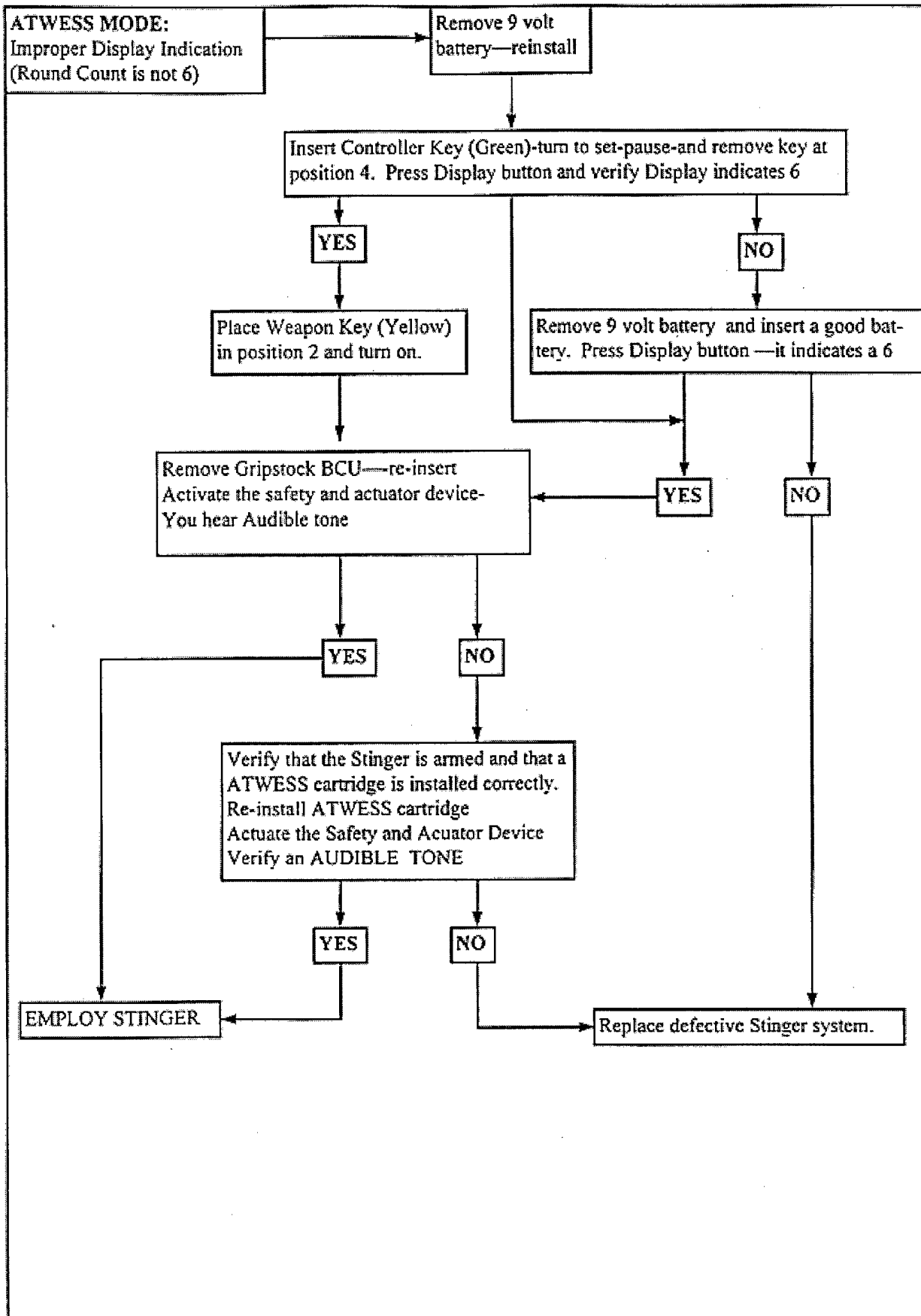
- A Remove the cartridge from the ATWESS chamber and check to see if the primer is dented. If it is dented **IT IS A DUD. RETURN THE CARTRIDGE FOR DISPOSAL.**

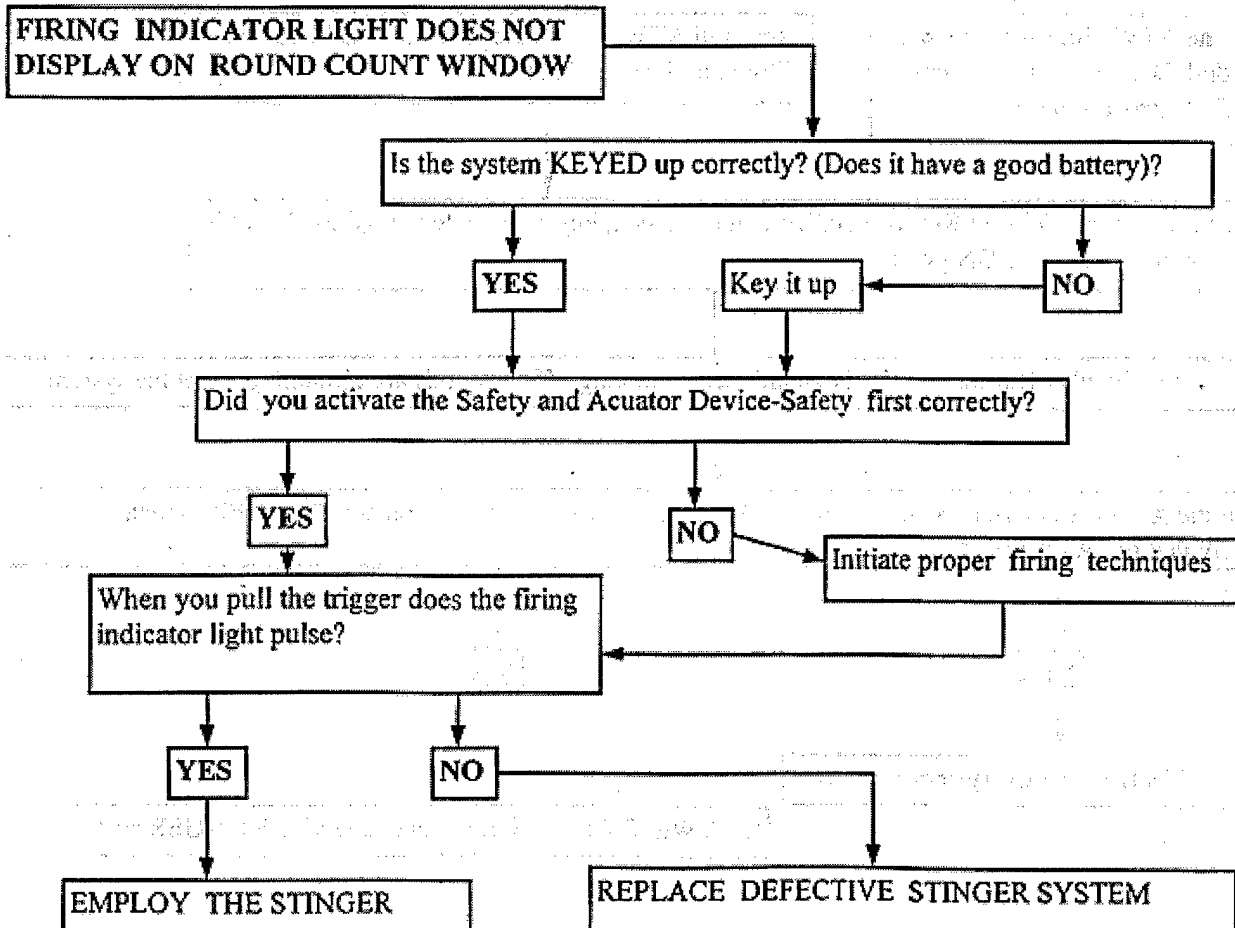
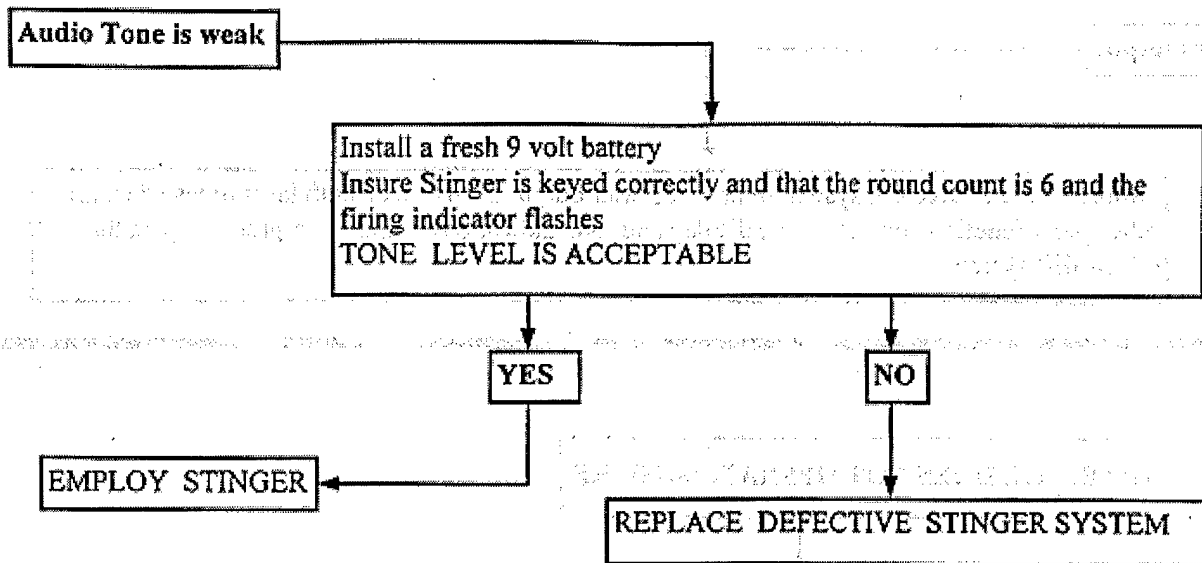
If the cartridge is not dented this indicates that the Stinger Simulator did not fire. Wait 10 seconds and try another cartridge. If the next cartridge does not fire, report on the DA Form 2404 and replace the MILES Stinger Simulator System



STINGER TROUBLESHOOTING







No Laser Output

Failure of the STINGER system to produce laser output from one or both laser tubes when all other parts function correctly, i.e., display and tone indications, indicates a problem with the STINGER system.

ATWESS CARTRIDGE DOES NOT OPERATE/MISFIRE

Remove ATWESS cartridge from Stinger.

Check cartridge primer and verify primer is dented

YES

The ATWESS cartridge is a dud, Dispose of IAW local EOD procedures.

NO

Reinstall ATWESS cartridge in ATWESS device.
Close and lock the breech door.

Verify a Weapon (Yellow) Key is installed in the weapon, key receptacle at position 2 and is rotated clockwise to the ON position.

Depress the Display Button and verify rounds are remaining. If no rounds are remaining, reset the system.

Arm the ATWESS device by pulling out ATWESS Safe/Arm lever. Trigger the STINGER system. Verify that the ATWESS fires.

YES

If ATWESS fires, return system to service

NO

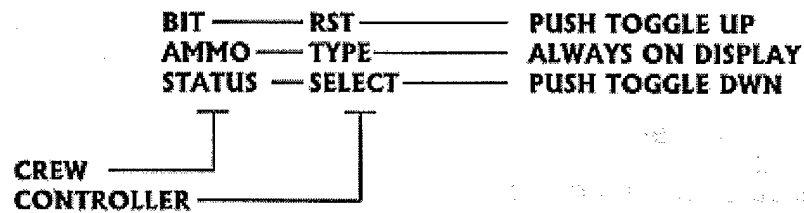
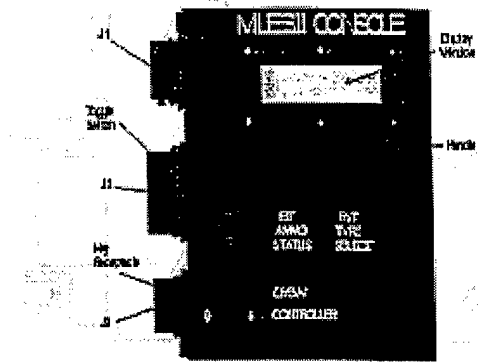
If ATWESS fails to fire, replace defective STINGER system

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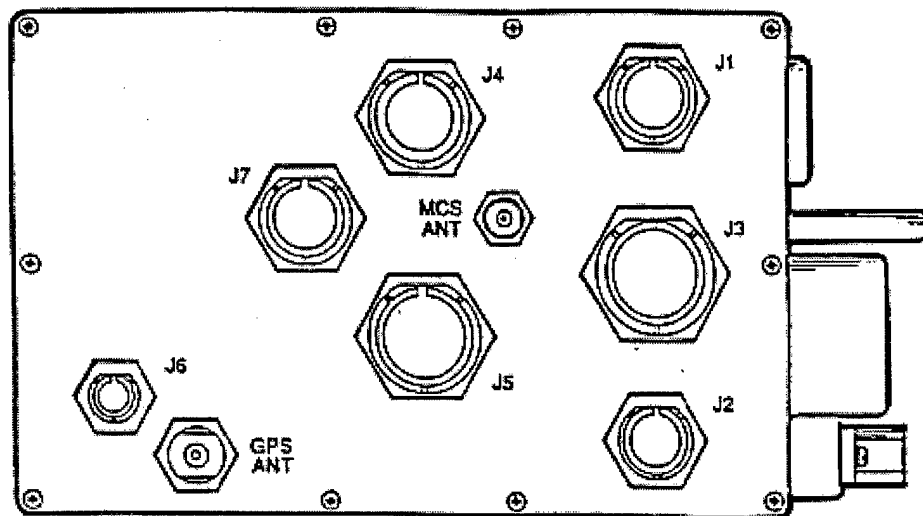
DRAGON

VEHICLE DETECTION DEVICE



1. CREW:
NO KEY REQUIRED.
2. CONTROLLER:
GREEN KEY REQUIRED, INSERT KEY, TURN COUNTER CLOCKWISE, TO OPERATE IN
CONTROLLER POSITION.

NOTE: CONTROLLER CAN RESURRECT PLATFORM BY INSERTING KEY TO CONTROLLER POSITION,
NO TOGGLE REQUIRED.

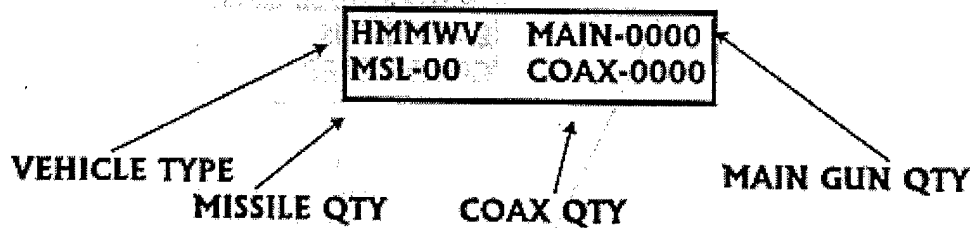
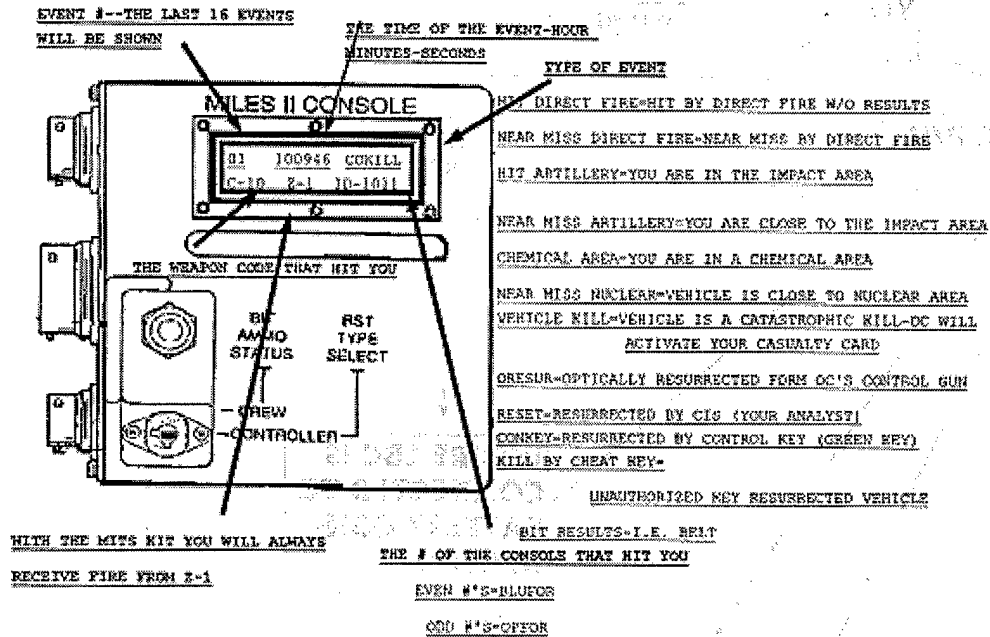


VDD CONNECTORS

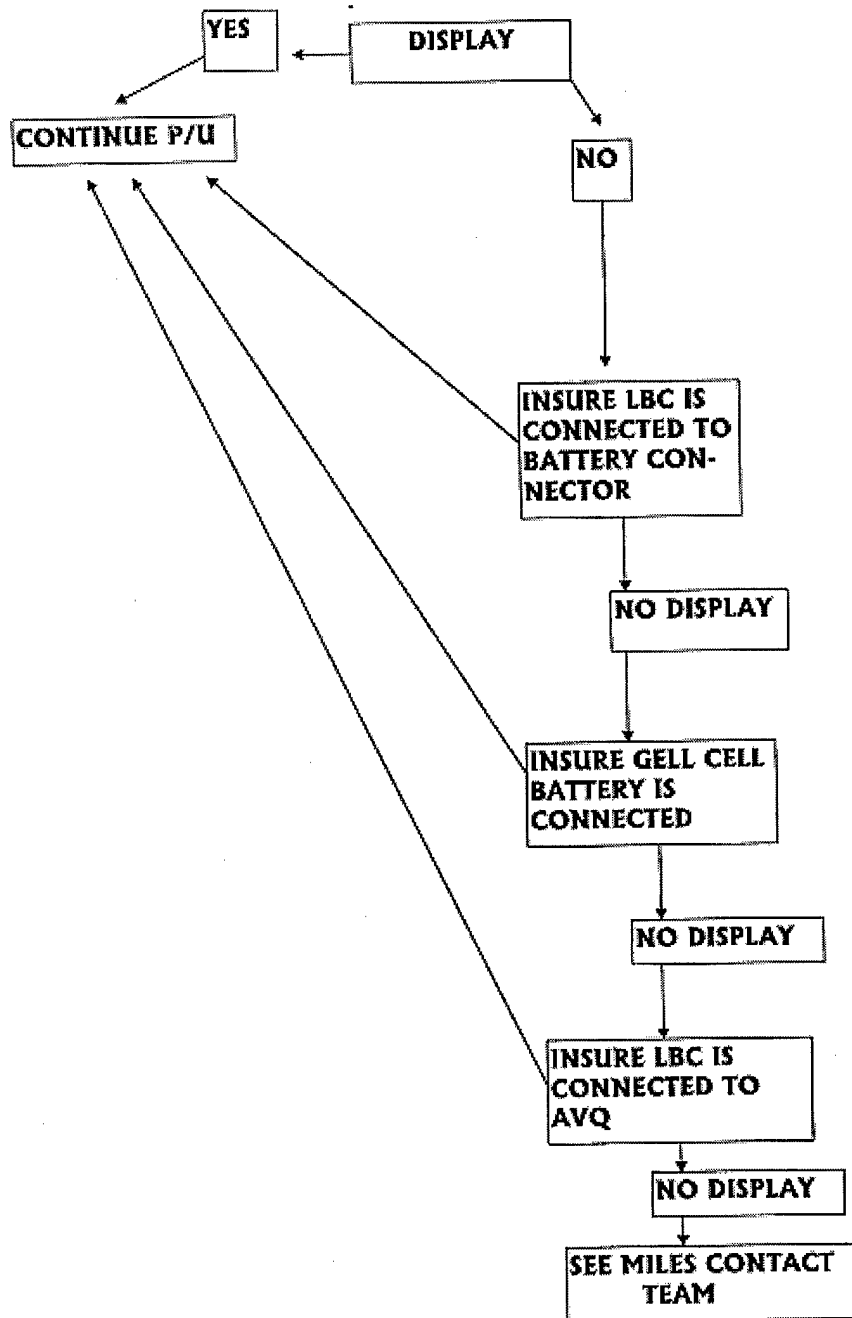
- J1 - TRANSMITTER CABLE
- J2 - TRIGGER CABLE
- J3 - MAIN/KILL INDICATOR CABLE
- J4 - RDA CABLE
- J5 - DCI INTERFACE CABLE

J6 - VEHICLE POWER CABLE
 J7 - INTERFACE CABLE (MES, RCD, AVQ)
 GPS - GPS ANT CABLE
 MCS - MCS ANT CABLE

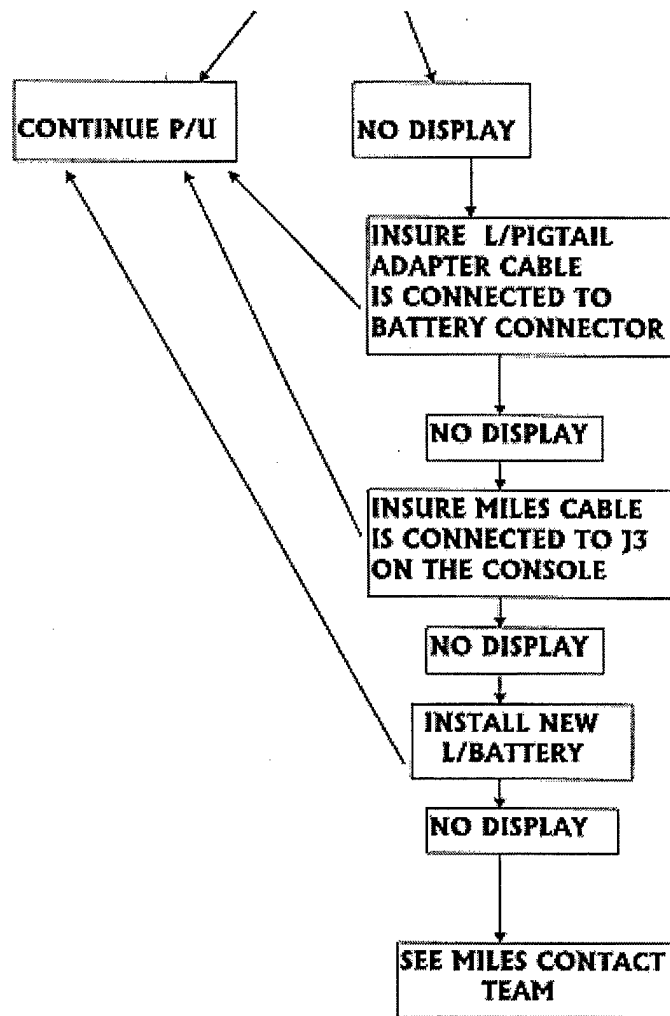
THE VDD -- WHAT IT TELLS YOU



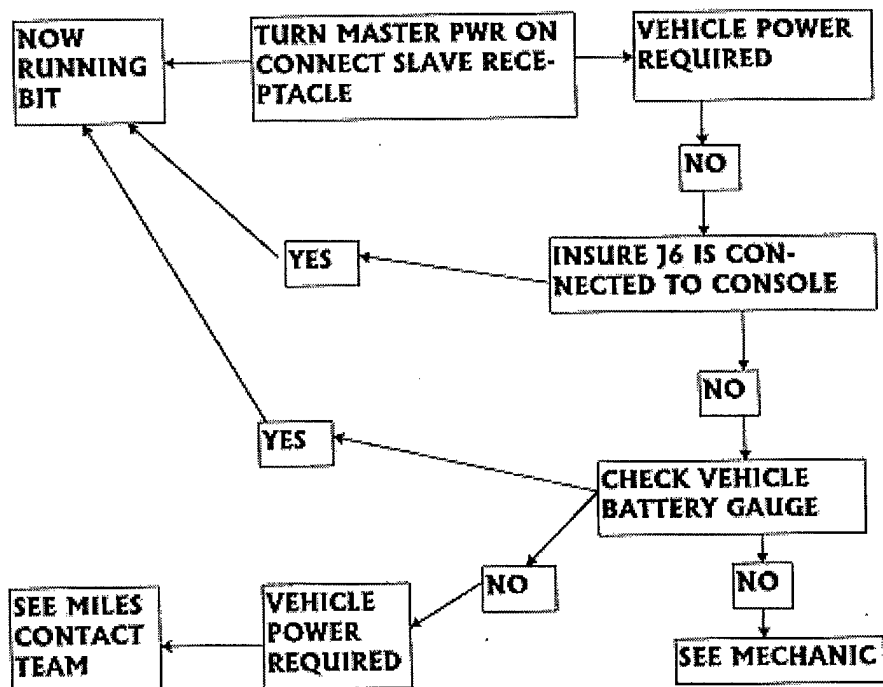
**CONNECT LITHIUM
 BY PASS CABLE
 (WITH NO VEHICLE POWER)**



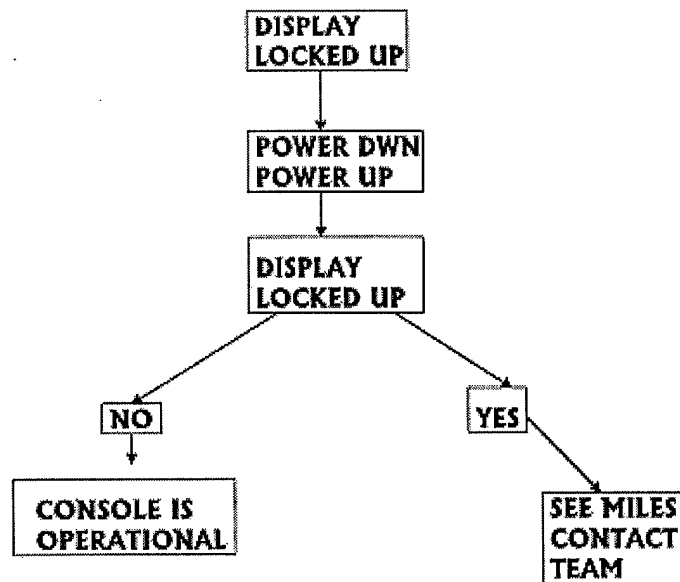
**CONNECT
LITHIUM BATTERY
(WITH NO VEHICLE POWER)**



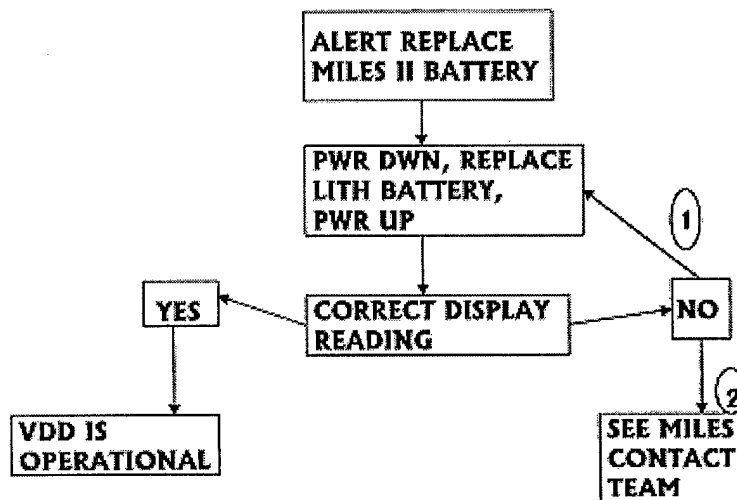
DISPLAY READS VEHICLE POWER REQUIRED



DISPLAY READS LOCKED UP



ALERT- REPLACE MILES II BATTERY



FOLLOW SEQUENCE 1,2.

NOTE: IF MESSAGE REPEATS PERIODICALLY CONTINUE PWR DWN, PWR UP.

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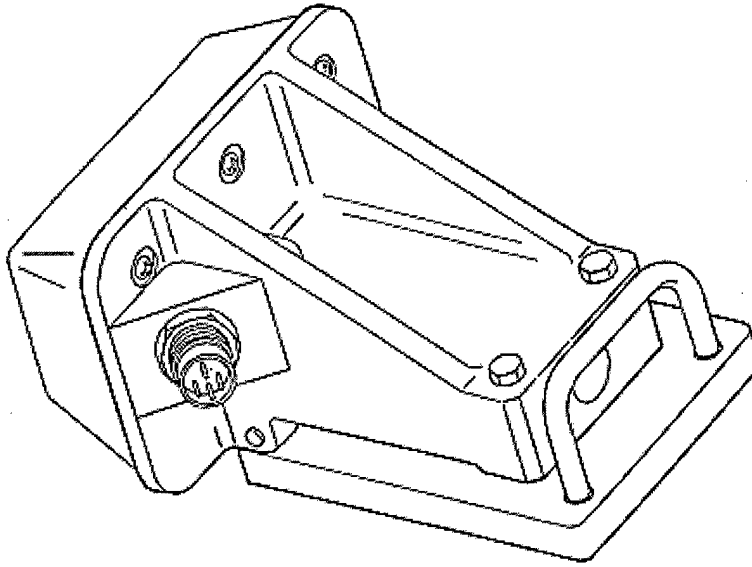
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[Mine Effects Simulator](#)

MINE EFFECTS SIMULATOR

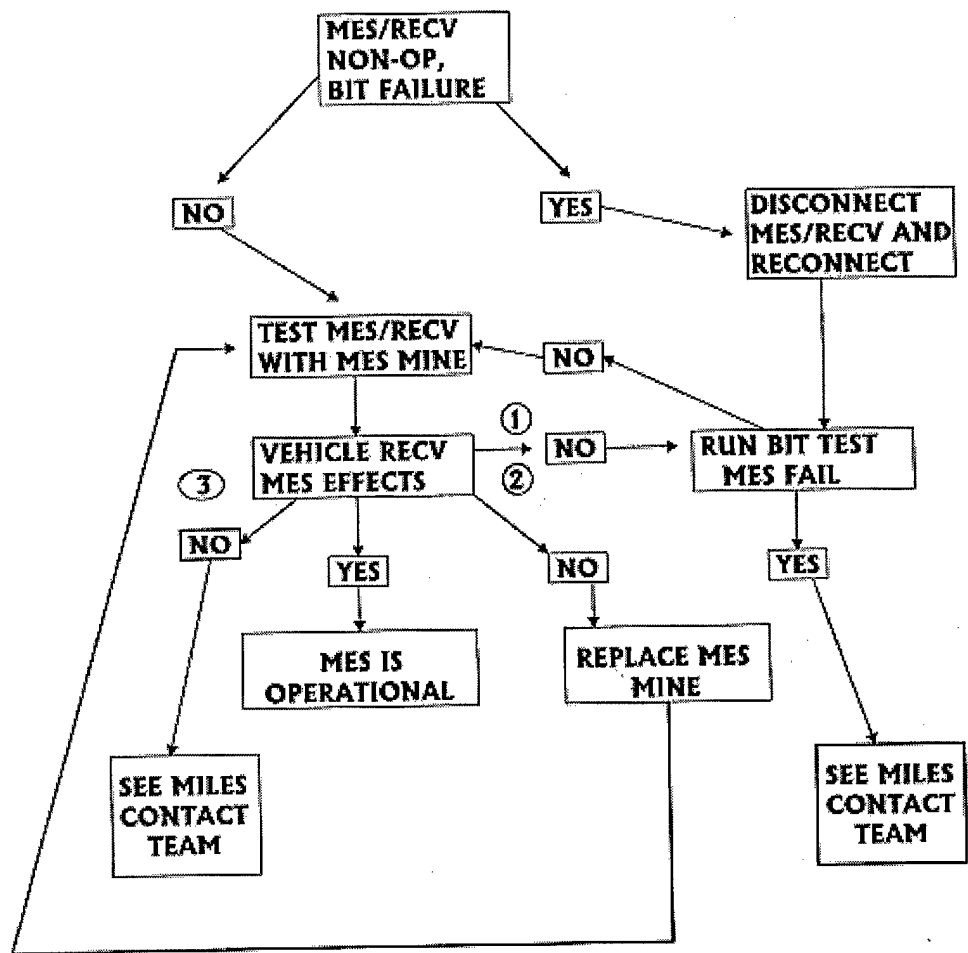
RECEIVER



MES OPERATIONS:

1. MES RECEIVER IS INSTALLED ON ALL MILES II VEHICLES.
2. MES RECEIVER RECEIVES ITS SIGNAL FROM THE MES HAND EMPLACED MINE.
3. CONNECT MES CABLE TO MES RECEIVER.
4. THERE WILL ALWAYS BE A MOBILITY OR VEHICLE KILL WHEN THE MES RECEIVER RECEIVES A SIGNAL.

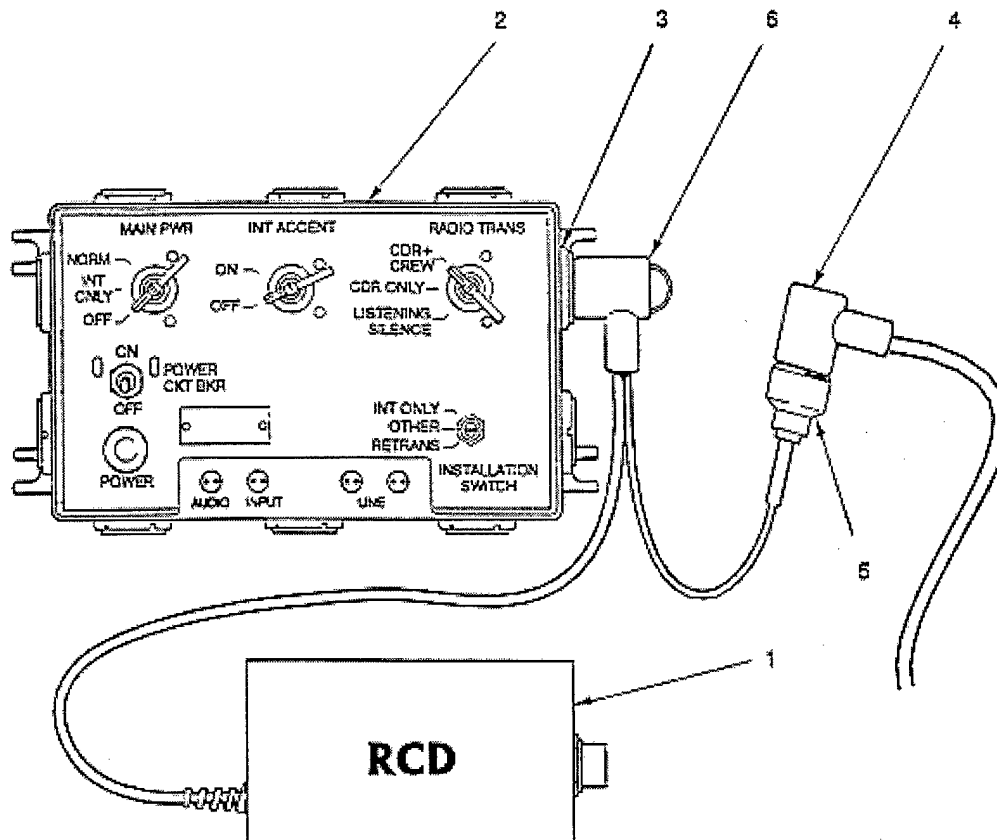
TROUBLESHOOT MES RECEIVER



FOLLOW NUMBER SEQUENCE 1, 2, 3.

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MILES II RADIO CONTROL DEVICE

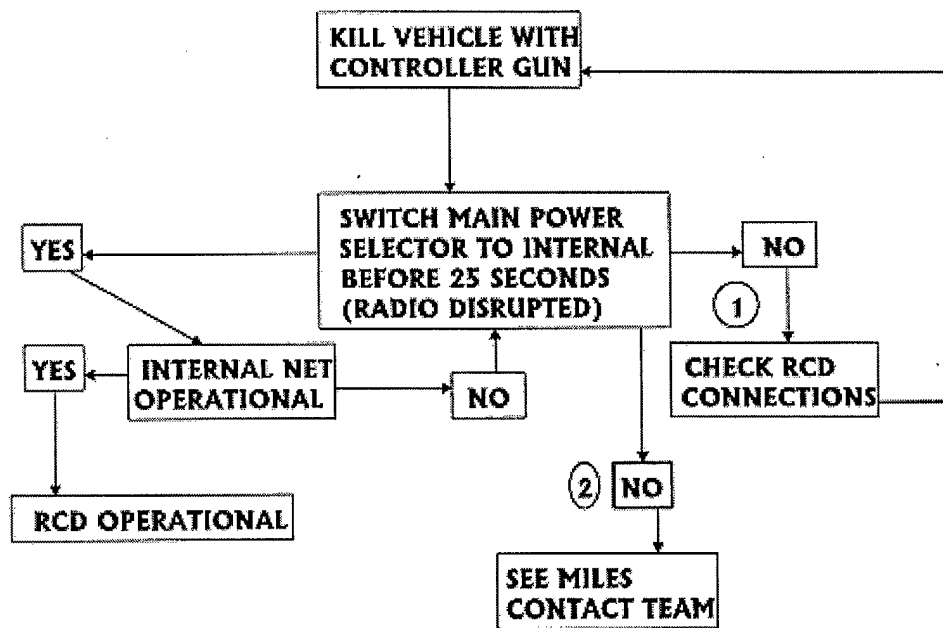


RCD OPERATIONS

1. DISCONNECT #4 FROM #3 ON 1780.
2. CONNECT #6 FROM RCD TO #3 ON 1780.
3. CONNECT RCD CABLE TO #1 ON RCD.
4. CONNECT #4 TO #5 ON RCD.

NOTE: RADIO CONTROL DEVICE WILL AUTOMATICALLY DISRUPT RADIOS WHEN VEHICLE RECEIVES VEHICLE AND COMMO KILLS.

RADIO CONTROL DEVICE TROUBLESHOOTING



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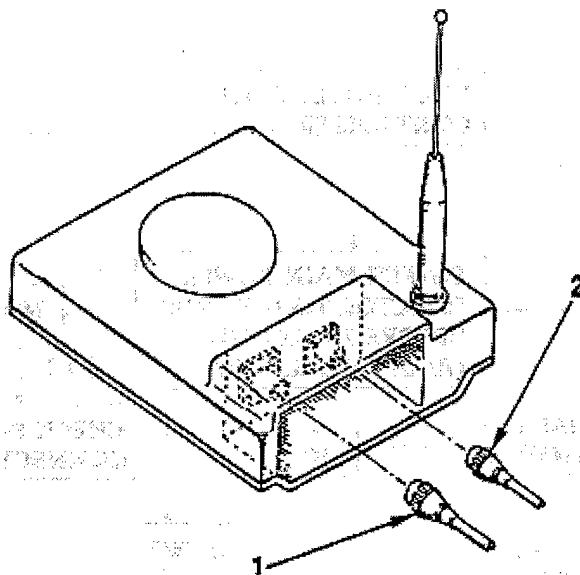
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[GPS/MCS Plate](#)

GPS/MCS PLATE



1. Connect GPS ANT. cable to J1 on antenna plate.
2. Connect MCS ANT. cable to J2 on antenna plate.

NOTE: Insure antennas have a clear view of sky, GPS only works internally.

TROUBLESHOOT GPS/MCS PLATE

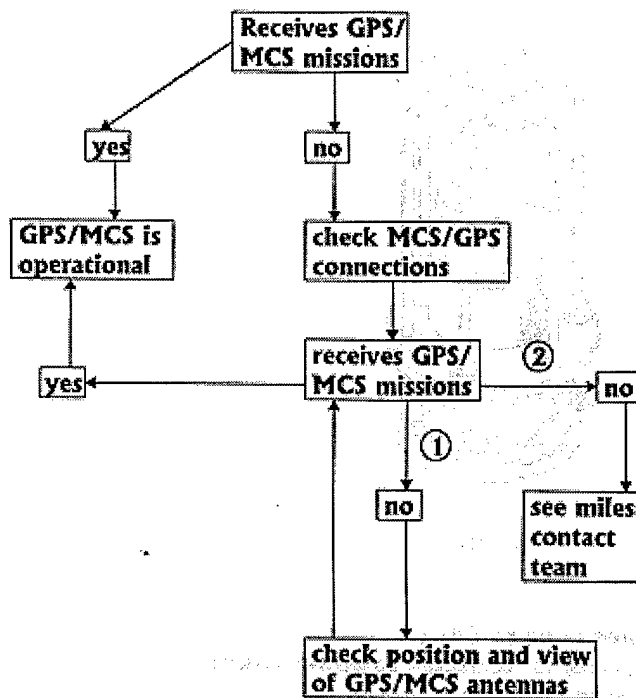


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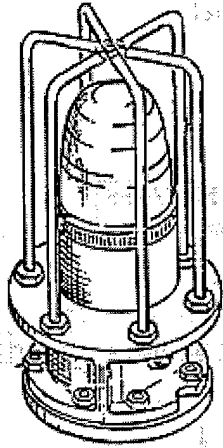
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COMBAT VEHICLE KILL INDICATOR



CVKI

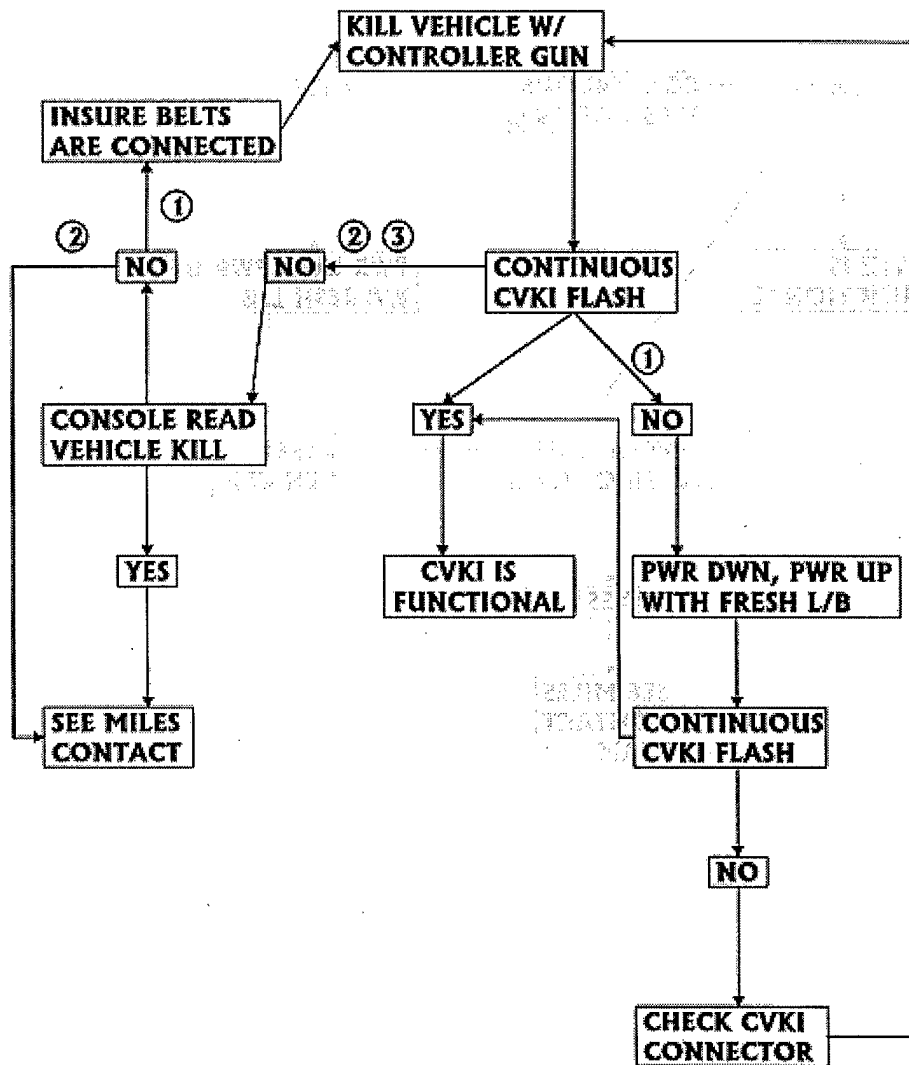
OPERATION:

1. Connect Kill indicator cable to CVKI.
2. Insure Battery connector is connected to power source.
3. Insure vehicle power source is on.

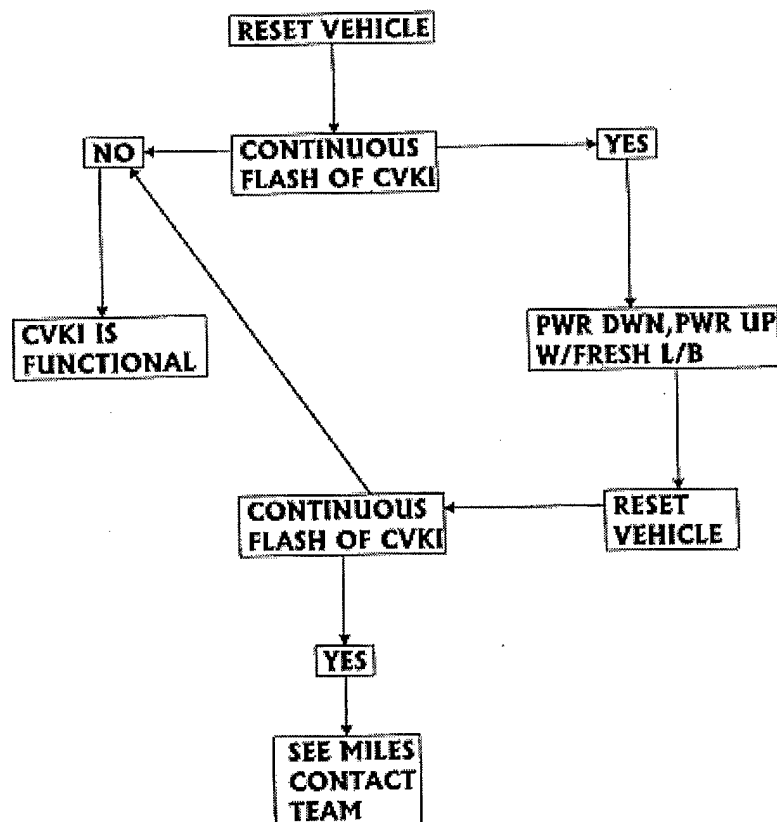
Note: Battery power and vehicle power required for CVKI to be functional.

TROUBLESHOOTING CVKI

NO FLASH



CONTINUOUS CVKI FLASH



TROUBLESHOOT SPORADIC CVKI FLASH

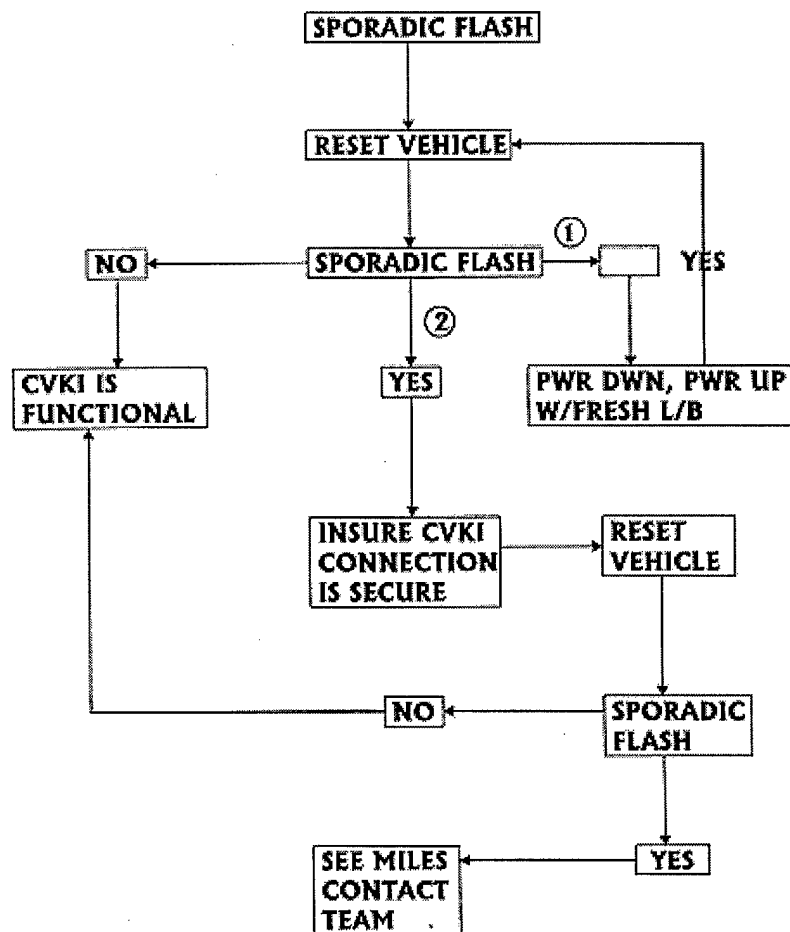


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Detector Belts

DETECTOR BELTS



DETECTOR BELT OPERATION / TROUBLESHOOTING:

1. CONTINUOUS SELF KILLING:
 - A. POWER DOWN, POWER UP W/FRESH L/BATTERY.
 - B. SEE MILES CONTACT TEAM.
 2. NOT RECEIVING DIRECT FIRE SIGNAL:
 - B. INSURE BELTS ARE CONNECTED TO DETECTOR BELT CABLE.
 - C. INSURE CONTROLLER GUN IS OPERATIONAL.
 - D. INSURE SENSORS ARE CLEAN.
 - E. POWER DOWN, POWER UP WITH FRESH LITHIUM BATTERY.
 - F. SEE MILES CONTACT TEAM.
 1. BROKEN OR FRAYED SENSORS:
 - C. SEE MILES CONTACT TEAM.
 1. BELTS/ VELCRO FALLING OFF:
 - D. BELT: BRUSH OF HOOK (VELCRO) OF VEHICLE AND PILE (VELCRO) OF BELT.
 - E. SEE MILES CONTACT TEAM.
 - F. VELCRO: SEE MILES CONTACT TEAM.
-

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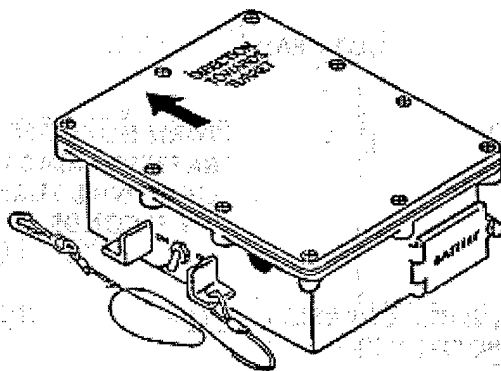
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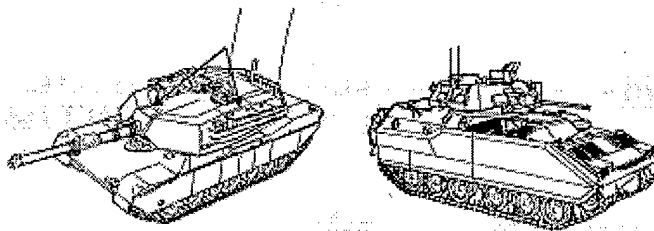
[Hull to Turret Transmitter](#)

HULL TO TURRET TRANSMITTER

HUTT



HUTT: IS MOUNTED ON M1 AND M2/3 VEHICLES.



1. HUTT OPERATES OFF 1-9 VOLT BATTERY.
2. TOGGLE MUST BE IN THE ON POSITION.
3. TEST BY RUNNING A BIT TEST.

TROUBLESHOOT HUTT

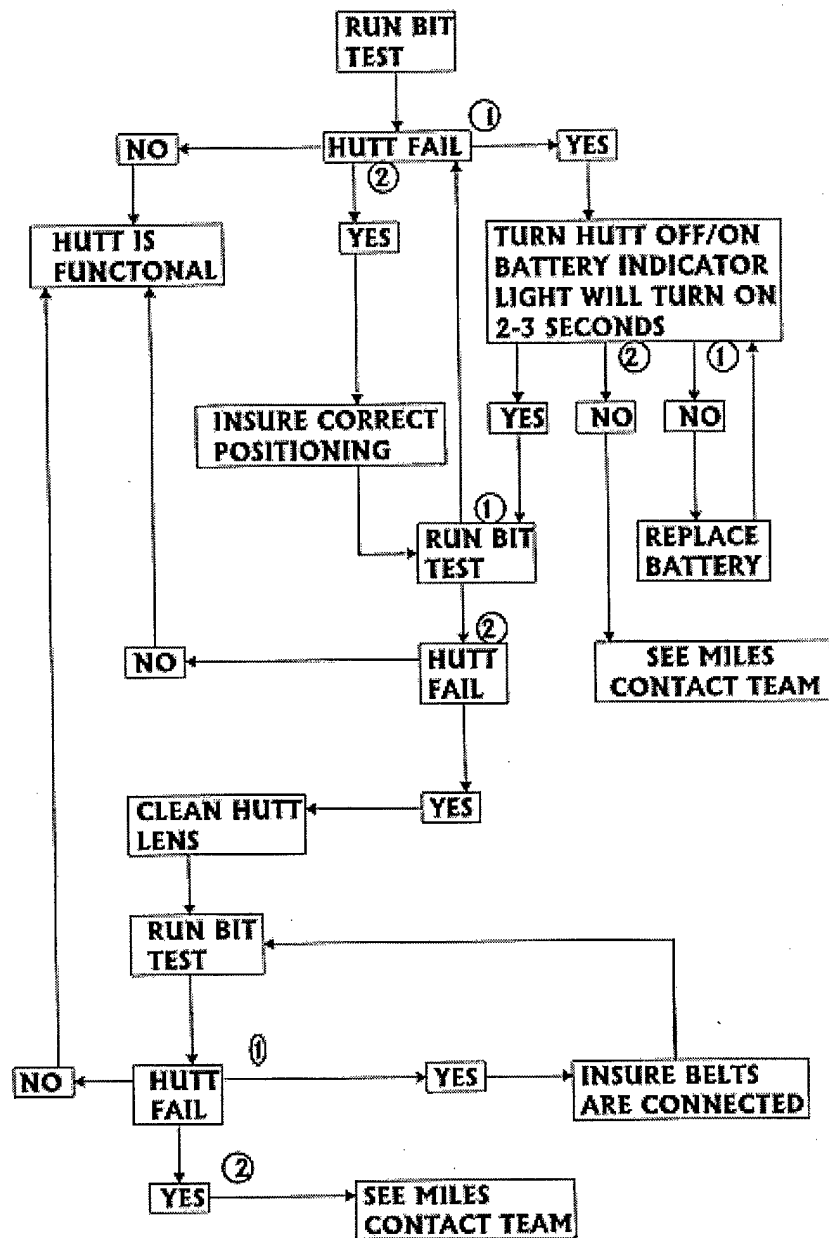


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MOBILE INDEPENDENT TARGET SYSTEM

MITs OPERATING AND TROUBLESHOOTING PROCEDURES

1. INSTALL 4 EA. 6-VOLT BATTERIES OR USE VEHICLE POWER WITH THE APPROPRIATE POWER CABLE. INSURE THAT BATTERIES ARE 4.5-6.5 VOLTS OR THAT YOU HAVE A GOOD POWER CONNECTION WITH THE SLAVE CABLE CONNECTOR.

A. RUN A BUILT-IN-TEST

B. OBSERVE THAT THE FOLLOWING EVENTS OCCUR:

1. SONAR ALERT WILL BEEP ONCE.
2. STROBE LIGHT WILL FLASH ONCE DISPLAY WILL READ "0000" AND SCROLL THROUGH ALL NUMBERS TO "9999".
3. AFTER ONE SECOND A TWO DIGIT OR FOUR DIGIT CODE WILL DISPLAY.

NOTES: DETECTORS ON SDA WILL NOT WORK WHEN USING DETECTOR ARRAY CABLE.

IF YOU RECEIVE A 01 CODE WHEN USING VEHICLE POWER, CHECK VEHICLE VOLTAGE GAUGE INSURE THAT IT IS IN THE GREEN BAND THEN CHECK POWER CONNECTORS.

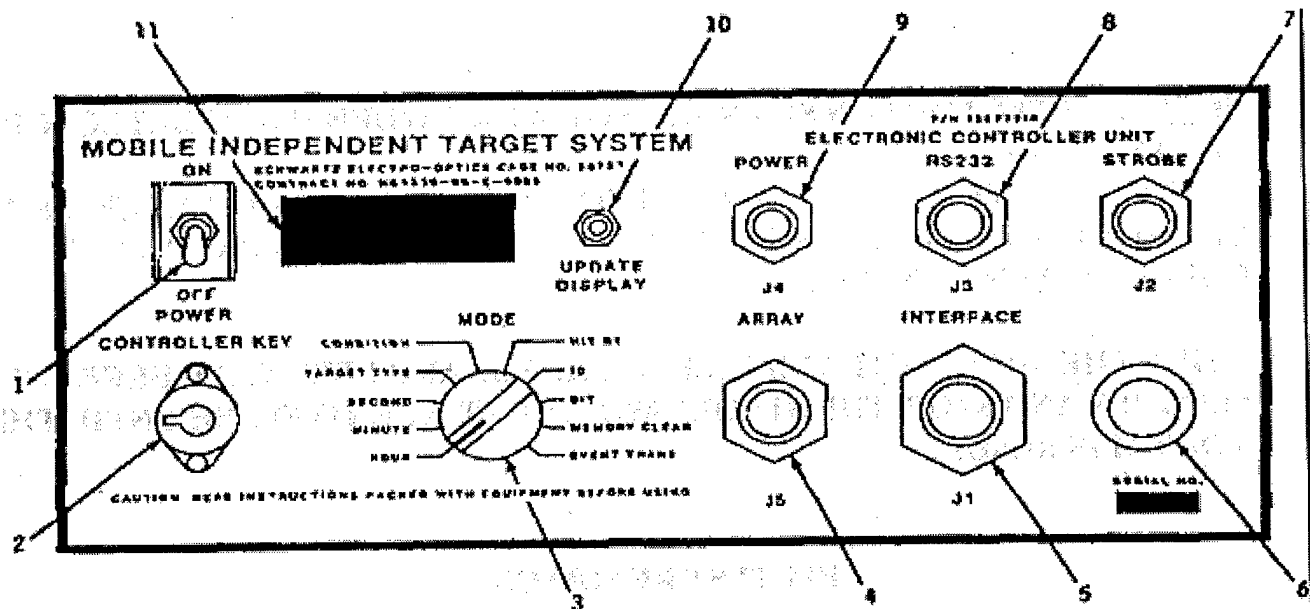
WHEN THE MITs IS HIT AND KILLED THE SONAR ALERT WILL BEEP FOR 30 SECONDS AND STOP, THE STROBE WILL CONTINUE TO FLASH UNTIL THE SYSTEM IS RESET.

BIT TEST READINGS

DISPLAY READING	PROBLEM	REQUIRED ACTION
"00"	NONE	MITs OK. NONE
"01"	BATTERIES LOW	REPLACE BATTERIES AND RETEST.
"02"	SDA OR SDA/ECU CABLE BAD	REPLACE SDA, RETEST REPLACE SDA/ECU CABLE—RETEST.
"03 OR 0203"	DETECTOR ARRAY BAD	REPLACE DETECTOR ARRAY, RETEST.
"04,05"	ECU BAD	REPLACE ECU

MILES MITs ELECTRONIC CONTROL UNIT (ECU)

1. Power Switch
2. Controller Key Switch
3. Mode Select Switch
4. Detector Array Connector
5. Interface Cable Connector
6. Sonalert
7. Strobe/Detector Array Cable Connector
8. RS232 interface Connector
9. Power Cable Connector
10. Update display Switch
11. Display



ENABLE THE MITS KIT TO PORTRAY A TARGET FOR MILES WEAPONS PRACTICE/BORESIGHT AT HOME STATION (TARGET #3 - ADMIN/LOG TARGET TYPE).

AFTER YOU POWER UP AND RUN A BIT TEST INSERT THE CONTROL KEY INTO THE KEY SWITCH (2) AND TURN ON (LEAVE IT ON). PRESS THE UPDATE SWITCH FOR 3-5 SECONDS AND THE #0001 WILL START TO SCROLL 1-4. STOP AT #3. TURN THE CONTROL KEY BACK AND TAKE IT OUT.

MITS KIT

1. Install one 12 volt Lithium battery.
 - A. Place battery into battery pouch.
 - B. Connect pigtail adapter into the battery.

Display shall read

**ENCODER OK
DECODER OK**

Followed by two alternating flashing messages which should read

VEHICLE POWER REQUIRED	KILL BY SYSTEM POWER ON
-----------------------------------	------------------------------------

2. MITS kits will plug in their slave cables, or connect the J6 on the console.

The system will automatically run a BIT test. Display will read

**STANDBY NOW
RUNNING BIT TEST**

Note: If the VDD displays following messages:

**ALERT REPLACE
MILES-2 BATTERY**

Proceed with the next step.

- 3. MITS kits will UNPLUG their slave receptacles.
- 4. Install a fresh lithium battery.

Follow steps one and two above with new battery.

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AUDIO VISUAL CUE (A/V CUE)

Quick Reference Card

CAUTIONS AND WARNINGS:

1. ALWAYS ASSUME THE A/V CUE IS LOADED AND ARMED IF THE BARREL PLATE AND /OR THE SAFE/ARM KEY ARE INSTALLED.

A/V Cue should not fire unless connected to an active SAWE/MILES II VDD.

2. IF SAFE/ARM key is inserted into bottom of A/V Cue, ASSUME UNIT IS ARMED! Keep clear unless reloading or performing maintenance.

ALWAYS REMOVE SAFE/ARM KEY WHEN SERVICING.

3. Do not use A/V Cue as a step. Do not sit or place anything on or near top of A/V Cue.

4. After device is armed, alarm will sound for 2-4 seconds prior to firing. KEEP CLEAR.

5. A/V Cue weighs 60 pounds. THIS IS A TWO-MAN LIFT.

A/V CUE INSTALLATION:

All installation procedures will be performed only by qualified personnel.

CHECKOUT:

1. Place the SAFE/ARM key into the SAFE mode and remove the key.

2. Wait 30 seconds then remove the barrel plate.

a. Always assume the unit is loaded when the barrel plate is installed.

b. Remove the barrel plate by inserting the key into the barrel plate lock and turn the key to unlock the BARREL PLATE.

c. Release all four BARREL PLATE latches.

d. Carefully remove the barrel plate.

3. Perform a BIT test on the SAWE/MILES II VDD.

a. The A/V Cue will only operate in conjunction with a properly functioning SAWE/MILES II system.

b. Correct any MILES problems before proceeding.

4. A/V Cue Self Test: READ (1)-(4) BEFORE PROCEEDING.

a. Insert SAFE/ARM key into arming switch and turn to ARM position.

b. Green BIT lamp on interface panel will light for about ten (10) seconds.

c. After 15 seconds the alarm will sound for 2-4 seconds.

d. If steps (2) and (2) do not occur, remove the key and perform steps (1)-(3) again. If second attempt fails, do NOT reload pyrotechnic devices onto the A/V Cue. Vehicle must be seen by the contact team.

5. If the A/V Cue has passed the Self Test, it may be placed into operation by following the reload procedures.

RELOAD PROCEDURES:

1. Always perform CHECKOUT procedures prior to reloading.
2. Rotate key to "SAFE" position and remove the key.
3. With the barrel plate removed (See CHECKOUT), reload the barrel plate chambers.
4. Replace the barrel plate on the A/V Cue. Insert the key into the barrel plate and turn to unlock.
5. Lock the barrel plate and remove the key.
6. Fasten all four barrel plate latches.
7. Insert the key in the arming switch and rotate to the "ARM" position. This will initiate the self test and the alarm will sound.
8. The A/V Cue is now loaded. Operation will now be fully automatic.

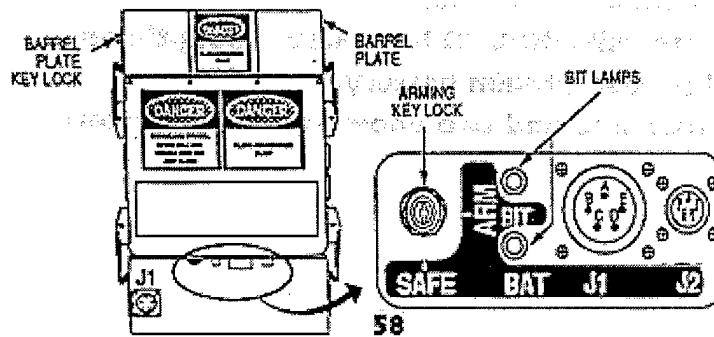


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M2/M3

M2/M3

1. Install one 12 volt Lithium battery.

- A. Place battery into battery pouch.
- B. Connect pigtail adapter into the battery.

Display shall read

**ENCODER OK
DECODER OK**

Followed by two alternating flashing messages which should read

VEHICLE POWER REQUIRED	KILL BY SYSTEM POWER ON
-----------------------------------	------------------------------------

2. Vehicles will turn on their Master power switches.

The system will automatically run a BIT test. Display will read

**STANDBY NOW
RUNNING BIT TEST**

Note: If the VDD displays following messages:

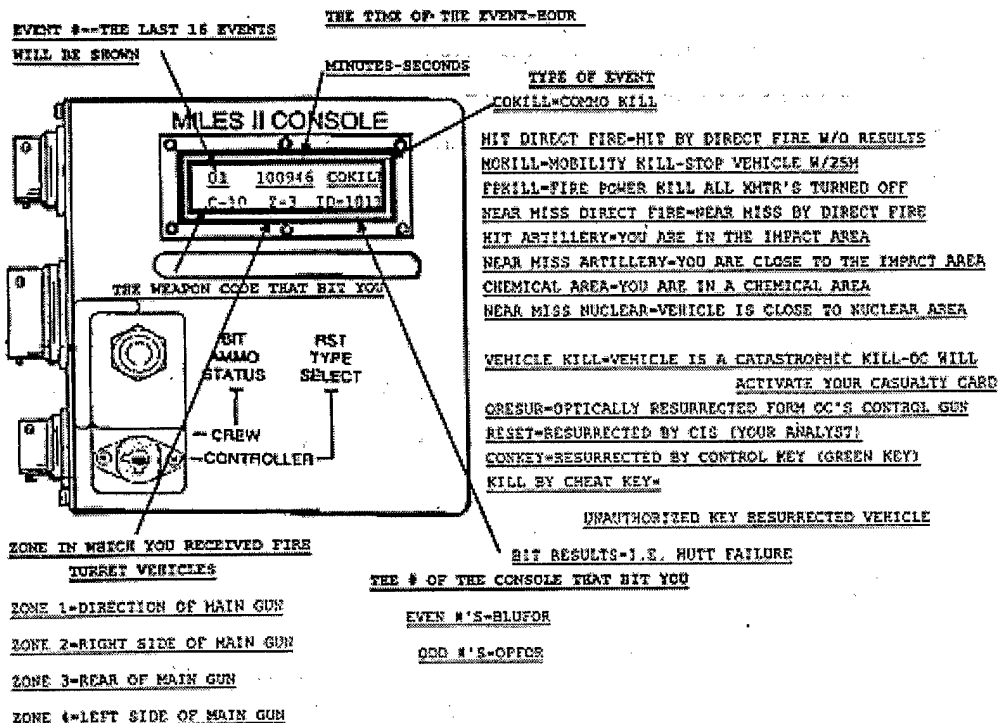
**ALERT REPLACE
MILES-2 BATTERY**

Proceed with the next step.

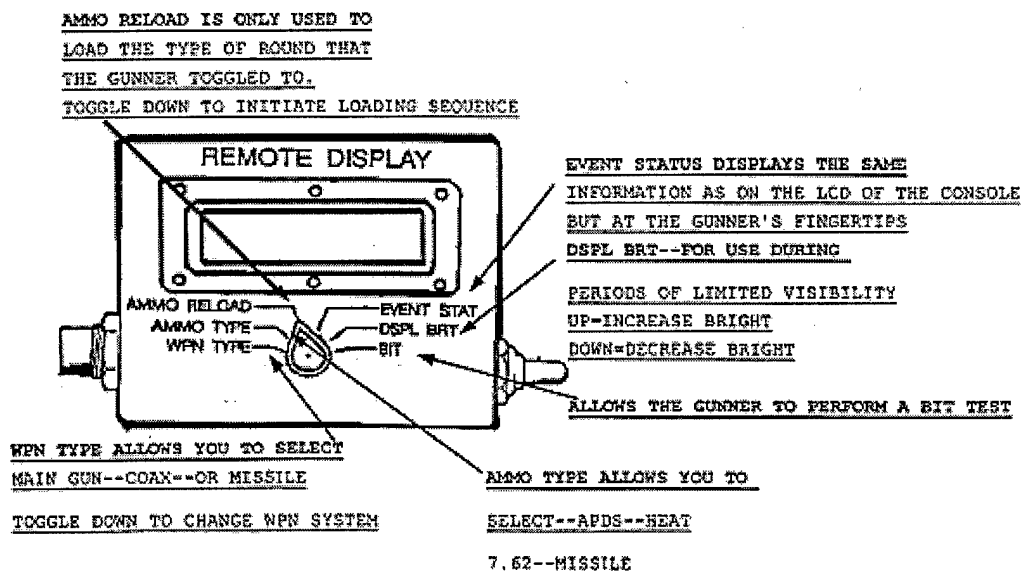
- 3. Turn OFF the Master Power Switches.
- 4. Disconnect the Lithium battery and turn into OC for a fresh battery.

Follow steps one and two above with new battery.

THE VDD -- WHAT IT TELLS YOU

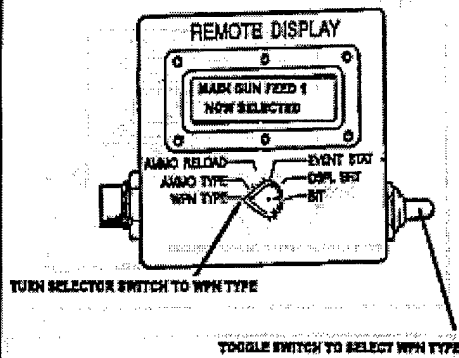


THE RDA -- WHAT IT TELLS YOU

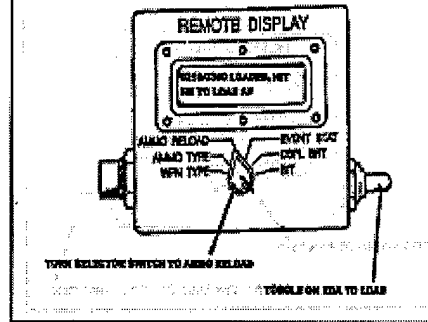


LOADING AP ROUNDS

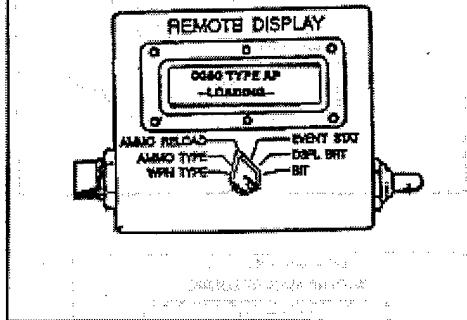
STEP 1



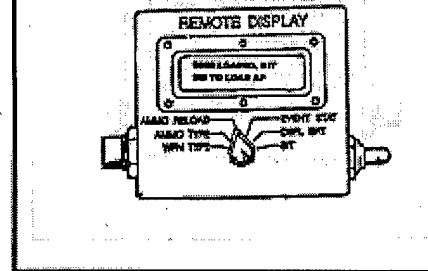
STEP 2



STEP 2,a

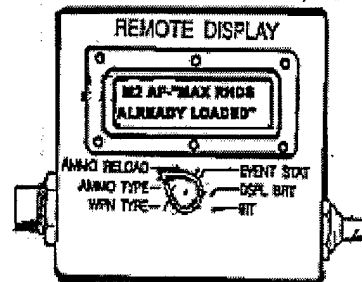


STEP 2,b

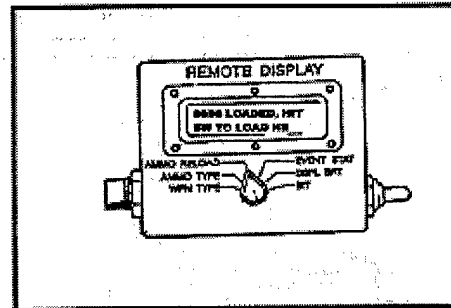
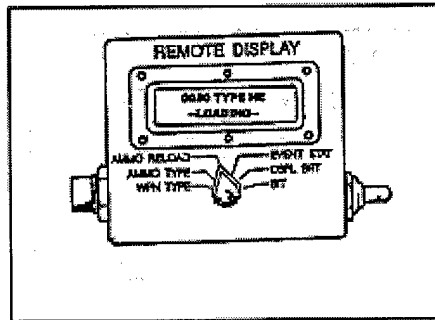
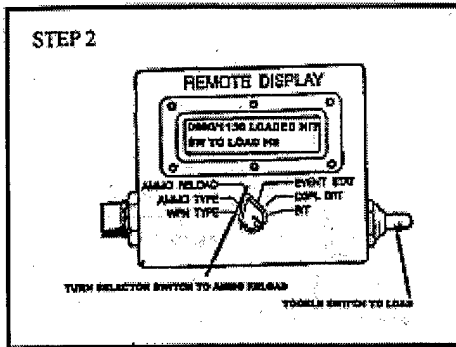
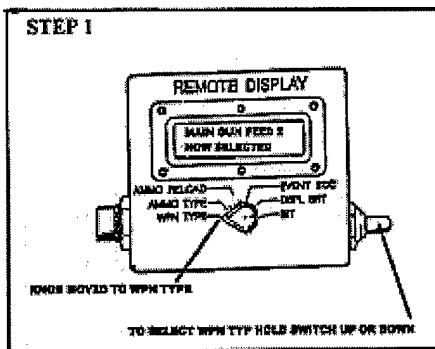


**FEED TRAY 1 WILL
AUTOMATICALLY
SELECT AP**

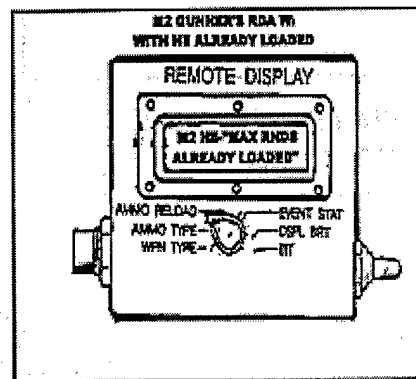
M2 GUNNER'S AND LOADERS IDA W/
MAX AP ROUNDS LOADED



LOADING HE ROUNDS



**FEED TRAY 2 WILL
AUTOMATICALLY
SELECT HE**



TOW MILES MESSAGE COMPONENTS

MESSAGE

H ARMOR HIT WORDS

D1 MICROSEC DELAY

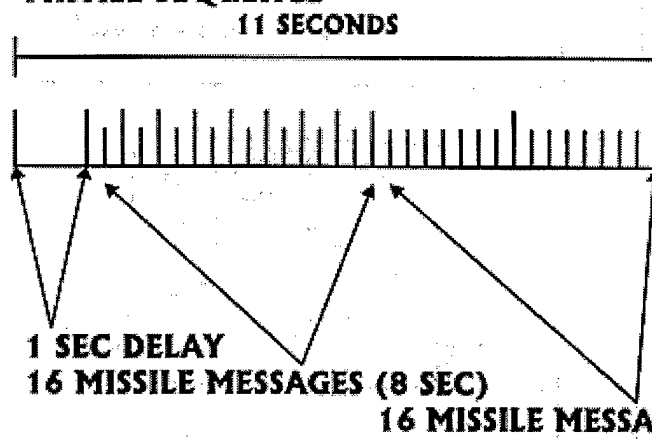
M MAN HIT WORDS

D2 MICROSEC DELAY

N NEAR MISS

(LIKE WORDS FOLLOW EACH OTHER WITHOUT DELAY)

MISSILE SEQUENCE

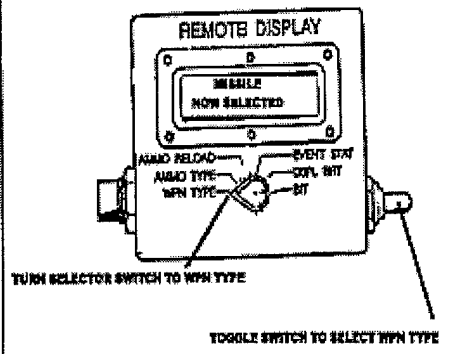


EACH MISSILE MESSAGE IS 8 MISSILE WORDS.

EACH CONSOLE OR ECU DECODES A HIT AFTER 22 MISSILE MESSAGES ARE DECODED.

RDA OPERATION MISSILE/COAX

STEP 1



STEP 2

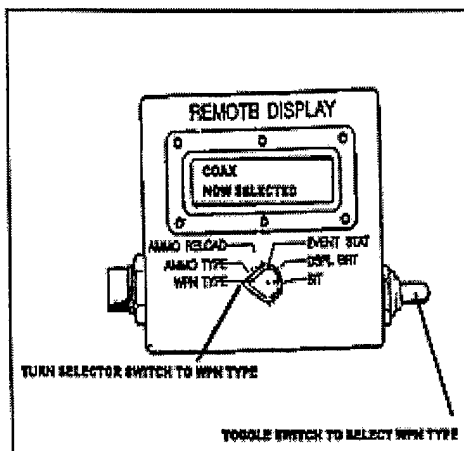
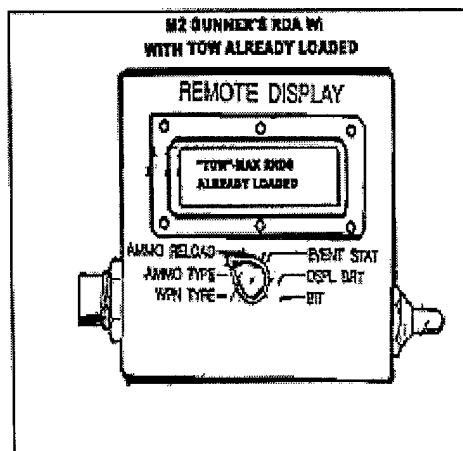
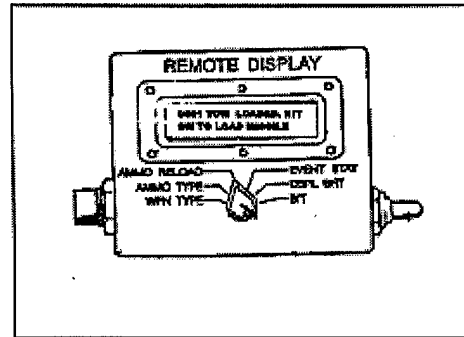
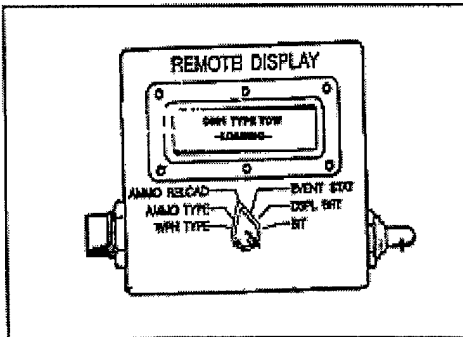
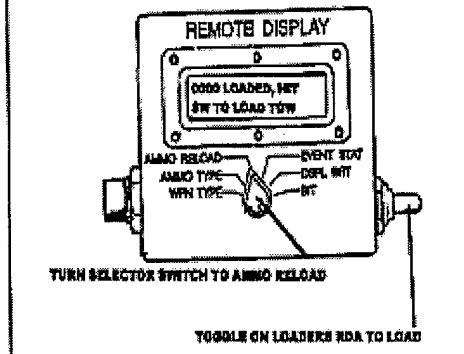


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MILES BORESIGHTING & ZEROING

NTC BORESIGHTING & ZEROING M2A2 TOW & 25M

* 25mm BORESIGHTING

1. Turn on master and turret power.
2. Switch ARM-SAFE-RESET switch to ARM on weapons control box.
3. Select AP/HI on weapons control box.
4. Select LO AMMO OVERRIDE on weapons control box, insure indicator light is not lit.
5. Select range "0" on RANGE DIAL.
6. Turn on NIGHT SIGHT.
7. Insure boresight adjustment knobs are on 0.
8. Using manual controls to lay 25mm reticles center mass of 2000m target.
9. Looking through the telescope on the 25mm transmitter, loosen the lock knob and put the cross hairs center mass of the 2000m Target.
10. Tighten the lock knob ensuring cross hairs remain center mass of the 2000m boresight target.
11. BORESIGHT IS NOW COMPLETE.

* 25mm ZEROING

1. Gunner aims at 2000m target and fires, (Verifying Boresight) if target flashes stop and go to next step, if no target flash manually move gun around target until target flashes and go to next step.
2. Once above is accomplished manually adjust Gunner's reticle center mass of 2000m target.
3. Have gunner manually move gun down $\frac{1}{2}$ target form and simultaneously fire gun until target stops flashing, he then will manually align the reticle center mass of his target using the boresight knobs.
4. The gunner will now manually move the gun up and simultaneously fire gun until he has a miss. Gunner will now refer his reticle $\frac{1}{2}$ down to center mass of target with the boresight knobs.
5. To find the mean for **DEFLECTION**, do the same as steps 3 and 4, but going from left to right.
6. Now refer NIGHT SIGHT reticle to DAY SIGHT reticle using boresight knobs.
7. DAY and NIGHT SIGHTS are now ZEROED.
8. Manually move 25mm center mass of 2000m target and fire for effect.

* TOW BORESIGHTING

1. Turn on MASTER and TURRET POWER.
2. Move MAG switch to HIGH until it clicks.
3. Raise TOW LAUNCHER.
4. Press TOW button on TOW CONTROL BOX.

5. Press TOW TEST button on TOW CONTROL BOX.
6. Press MISSILE TUBE 1 or 2 BUTTON. Insure TOW TUBES are in DRY FIRE and loaded in launcher ports 1 and 2.
7. Switch ARM-SAFE-RESET switch to ARM on weapons control box.
8. Select range "0" on RANGE DIAL.
9. Using a screwdriver put boresight adjustments center.
10. Using power controls, lay the TOW reticle center mass of 2500m target.
11. The Gunner then leaves the Gunner's station and aligns the TOW transmitter to the same aiming point that HE aligned the TOW ISU reticle.
12. **YOU ARE NOW BORESIGHTED.**

*** TOW ZEROING**

1. Two individuals are needed to adjust (zero) deflection.
2. Gunner fires TOW and one individual moves TOW transmitter.
3. Gunner fires TOW at 2500m target, if target flashes stop and go to next step, if no target flash, move TOW around target until target flashes and go to next step.
4. Once above is accomplished manually adjust left or right, center mass of 2500m target.
5. Loosen BLACK LOCK KNOB leaving one of four points on the black lock knob pointing towards the rear, to use as a guide point.
6. Outside individual manually moves TOW transmitter to the right ½ target form. Gunner fires TOW, the target should flash. The Tow transmitter is continually moved ½ target form to the right until the target **DOES NOT FLASH.**
7. Using your guide point on the BLACK LOCK KNOB, make a tick mark on the TOW bracket located directly below the BLACK LOCK KNOB.
8. Outside individual moves the TOW transmitter back to the starting point and then repeats the above action but in the opposite direction until the target **DOES NOT FLASH.**
9. Using your guide point on the BLACK LOCK KNOB make a tick mark on the TOW bracket located directly below the BLACK LOCK KNOB.
10. Now identify both tick marks, and put a third tick mark down half way in-between both tick marks, now manually move TOW transmitter to center tick mark while using the BLACK LOCK KNOB as a guide point.
11. Once above is accomplished, tighten BLACK LOCK KNOB.

DEFLECTION ADJUSTMENTS ARE NOW COMPLETE

12. Gunner fires TOW and the target should flash. Gunner fires and then moves the gunner's reticle down ½ target form until the target **DOES NOT FLASH. The gunner then refer his reticle center mass of the target with boresight screw.** Gunner repeats the above steps but in the opposite direction until the target **DOES NOT FLASH.** The gunner then refer his reticle ½ down to center of the target with boresight screw.
13. Refer Night sight..
14. Day and Night sight are **NOW ZEROED.**

1. After Main Gun is Boresighted and Zeroed refer the Gunner's Coax.
 2. Hold a MWLD in front of the Main Gun Transmitter (Coax) and tap the Coax Microphone on a metal object. The MWLD should have a continuous audible tone.
 3. The last step is to fire blank ammunition at a target to verify the complete weapon system is functional.
-

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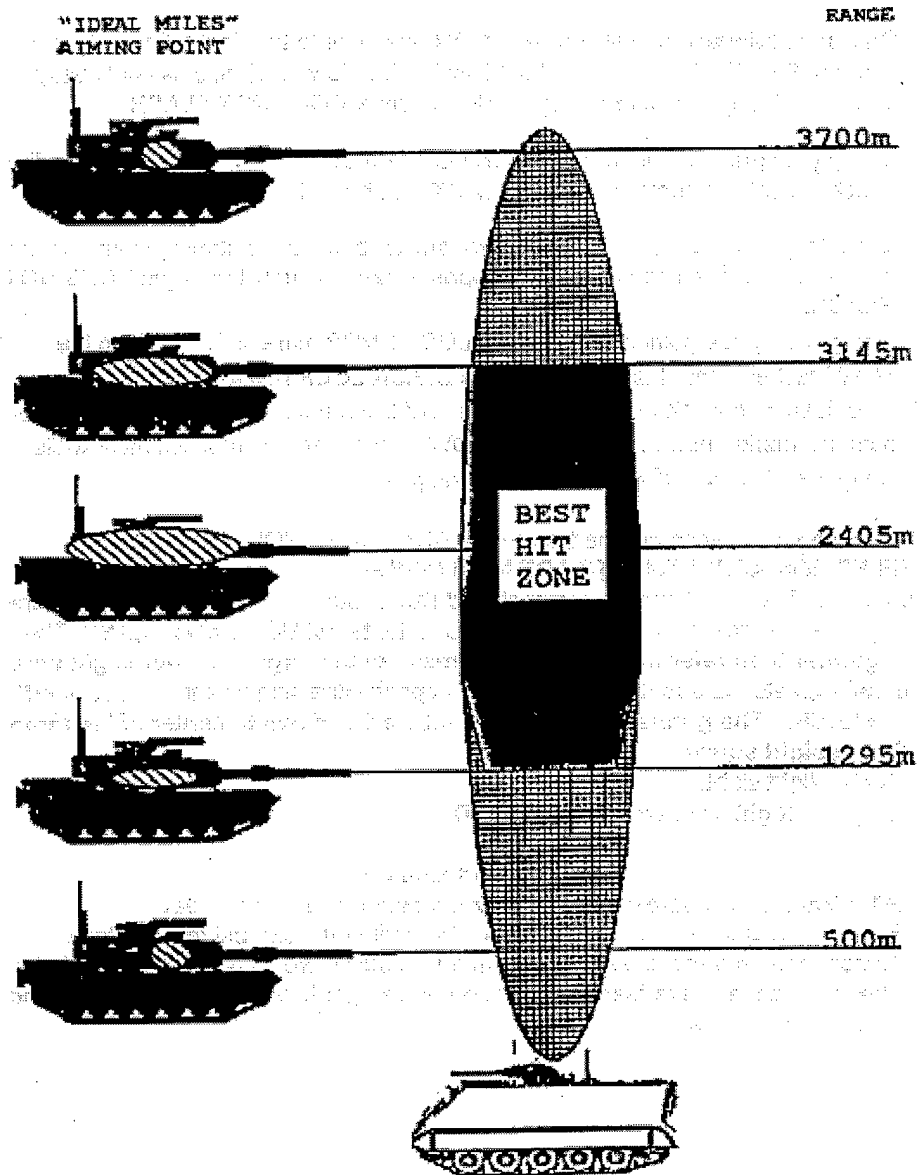
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[M1 Tank Guides](#)

M1 TANK GUIDES

M1A1 and M2/M3 LASER FOOTPRINT

Verified by:
1/4th Inf (OPFOR) CMTC
STRICOM - HIT CODE 07



M1A1

1. Install one 12 volt Lithium Battery
 - A. Place battery into battery pouch.
 - B. Connect pigtail adapter into the battery.

Display shall read

**ENCODER OK
DECODER OK**

Followed by two alternating flashing messages which should read

**VEHICLE POWER
REQUIRED** **KILL BY SYSTEM
POWER ON**

2. Turn on their Master power switches or the TNB Utility Outlet.

The system will automatically run a BIT test. Display will read

**STANDBY NOW
RUNNING BIT TEST**

Note: If the VDD displays following messages:

Proceed with the next step;

3. Turn OFF their Master Power Switches TNB Utility Outlet.

**ALERT REPLACE
MILES-2 BATTERY**

4. Disconnect the Lithium Battery and turn in to OC for a fresh battery.

Follow steps one and two above with new battery.

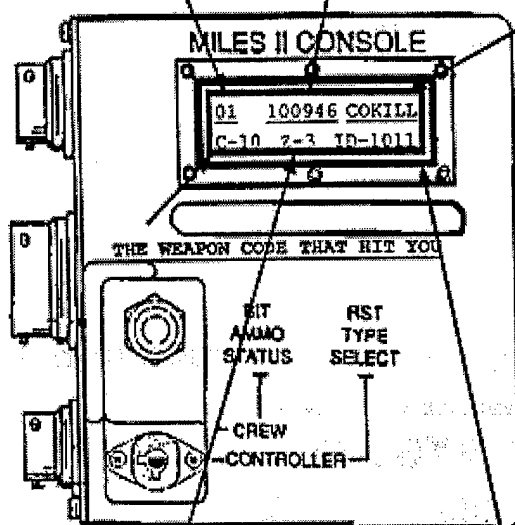
THE VDD - - WHAT IT TELLS YOU

EVENT #--THE LAST 16 EVENTS
WILL BE SHOWN

THE TIME OF THE EVENT-HOUR

MINUTES-SECONDS

TYPE OF EVENT



COKILL=COMMO KILL

HIT DIRECT FIRE-HIT BY DIRECT FIRE W/O RESULTS

MOKILL-MOBILITY KILL-STOP VEHICLE W/25M

FPKILL-FIRE POWER KILL ALL XMTR'S TURNED OFF

NEAR MISS DIRECT FIRE-NEAR MISS BY DIRECT FIRE

HIT ARTILLERY-YOU ARE IN THE IMPACT AREA

NEAR MISS ARTILLERY-YOU ARE CLOSE TO THE IMPACT AREA

CHEMICAL AREA-YOU ARE IN A CHEMICAL AREA

NEAR MISS NUCLEAR-VEHICLE IS CLOSE TO NUCLEAR AREA

VEHICLE KILL-VEHICLE IS A CATASTROPHIC KILL-OC WILL

ACTIVATE YOUR CASUALTY CARD

ORESUR-OPTICALLY RESURRECTED FORM OC'S CONTROL GUN

RESET-RESURRECTED BY CIS (YOUR ANALYST)

CONKEY-RESURRECTED BY CONTROL KEY (GREEN KEY)

KILL BY CHEAT KEY-

UNAUTHORIZED KEY RESURRECTED VEHICLE

BIT RESULTS-I.E. HUTT FAILURE

THE # OF THE CONSOLE THAT HIT YOU

EVEN #'S=BLUFOR

ODD #'S=OPFOR

ZONE IN WHICH YOU RECEIVED FIRE
TURRET VEHICLES

ZONE 1=DIRECTION OF MAIN GUN

ZONE 2=RIGHT SIDE OF MAIN GUN

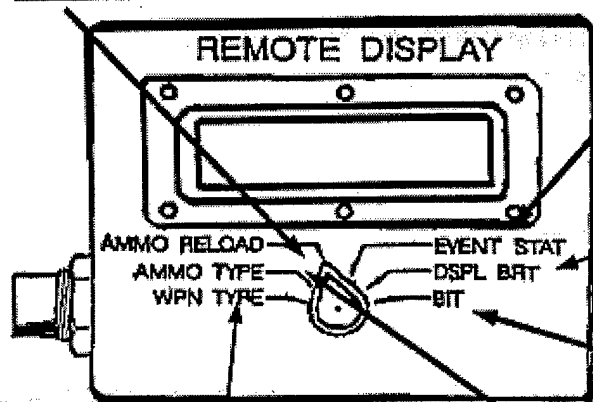
ZONE 3=REAR OF MAIN GUN

ZONE 4=LEFT SIDE OF MAIN GUN

THE RDA WHAT IT TELLS YOU

AMMO RELOAD IS ONLY USED TO
LOAD THE TYPE OF ROUND THAT
THE GUNNER TOGGLED TO.

TOGGLE DOWN TO INITIATE LOADING SEQUENCE



EVENT STATUS DISPLAYS THE SAME
INFORMATION AS ON THE LCD OF THE CONSOLE

BUT AT THE GUNNER'S FINGERTIPS

DSPL BRT--FOR USE DURING

PERIODS OF LIMITED VISIBILITY

UP=INCREASE BRIGHT

DOWN=DECREASE BRIGHT

ALLOWS THE GUNNER TO PERFORM A BIT TEST

WPN TYPE ALLOWS YOU TO SELECT
MAIN GUN--COAX--OR MISSILE

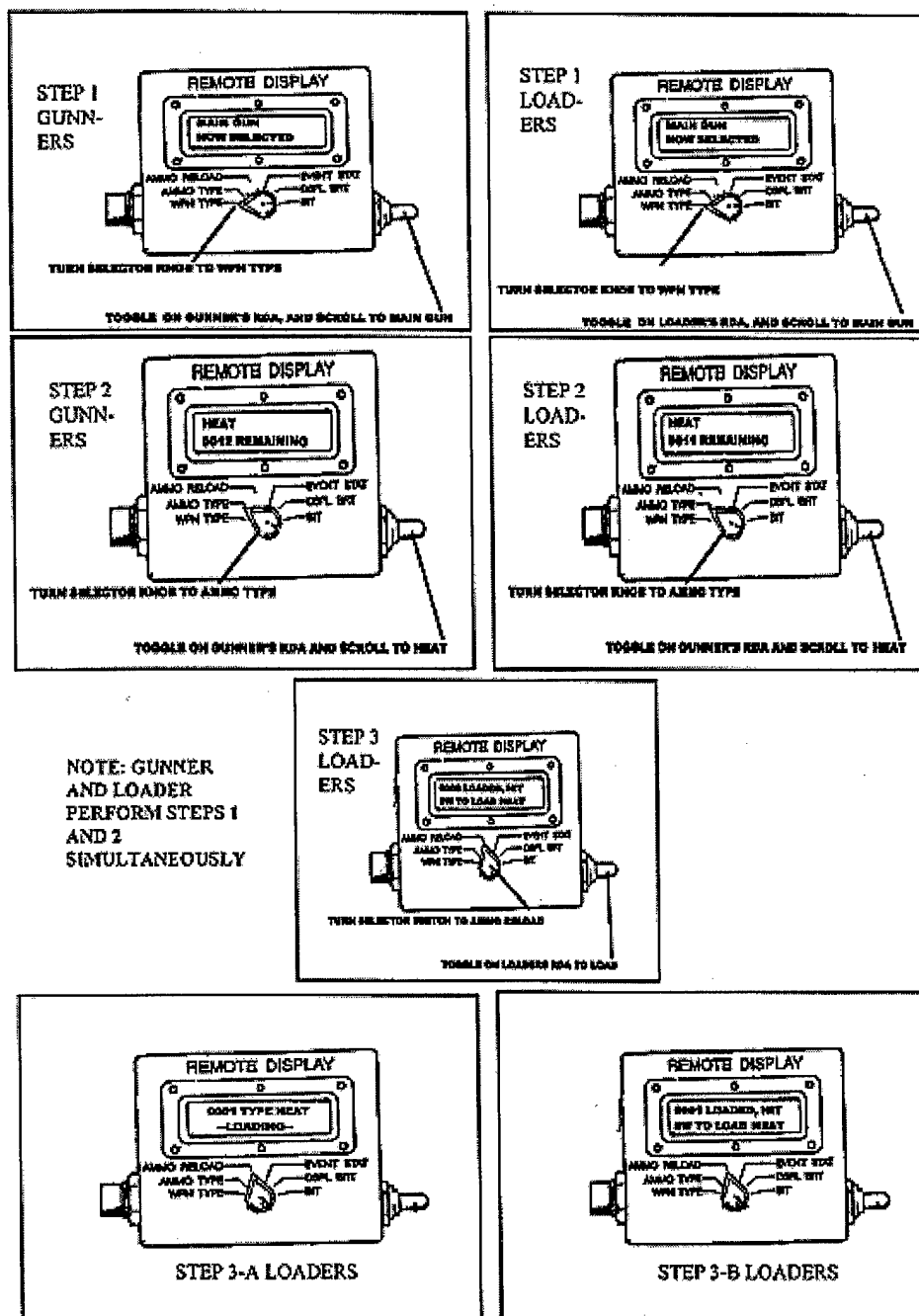
TOGGLE DOWN TO CHANGE WPN SYSTEM

AMMO TYPE ALLOWS YOU TO

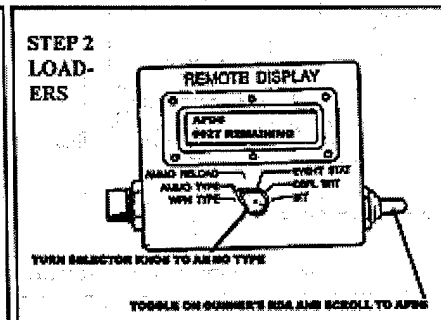
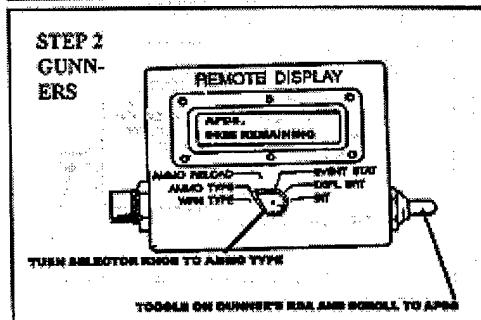
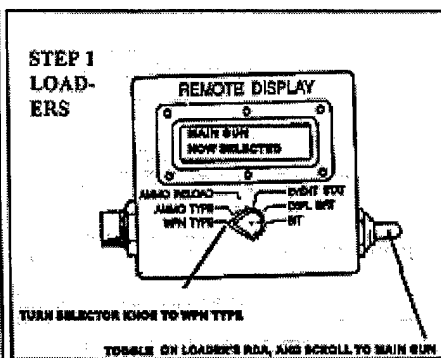
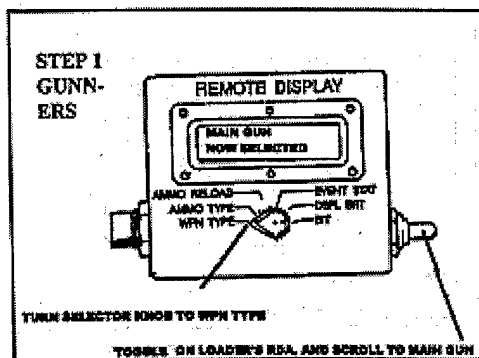
SELECT--APDS--HEAT

7.62--MISSILE

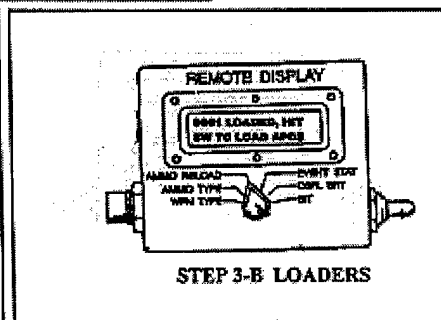
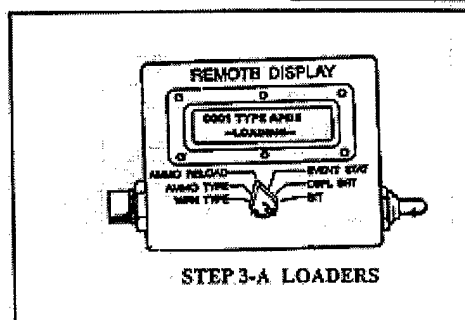
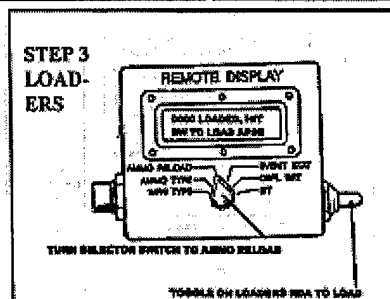
RDA OPERATION
HEAT₃RNDS



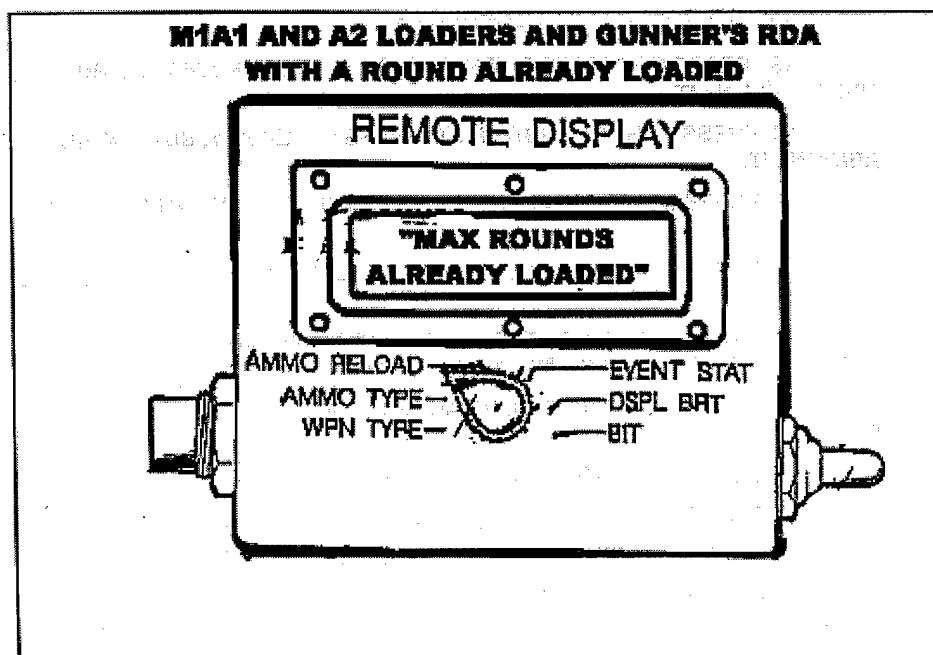
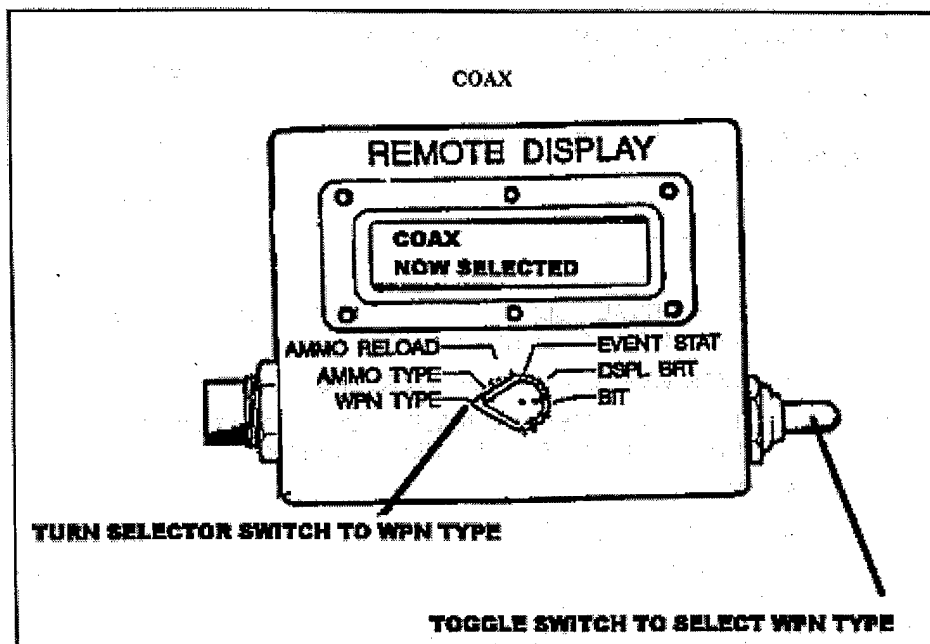
RDA OPERATION APDS RND



**NOTE: GUNNER
AND LOADER
PERFORM STEPS 1
AND 2
SIMULTANEOUSLY**



RDA OPERATION COAX



M1A1 TANK (120MM) MILES BORESIGHTING PROCEDURES

BORESIGHT THE MAIN GUN

NOTE: RECORD GPS ZERO DATA FOR FUTURE REFERENCE

1. POSITION TANK ON LEVEL GROUND, WITH GUN OVER FRONT SLOPE.
2. SET UP 1200 METER BORESIGHT TARGET OR KNOWN TANK TO TARGET RANGE.
3. WITH ENGINE RUNNING, ENSURE HYDRAULIC PRESSURE GAUGE READS 1500-1700 PSI.
4. TURN TURRET POWER ON.
5. SET THERMAL MODE SWITCH TO STANDBY AND PERFORM STEPS 4 & 1 WHILE WAITING FOR COOL DOWN.
6. CLEAN MILES GUN TRANSMITTER LENS.

7. FIRE TRANSMITTER AT A MWLD TO VERIFY THAT YOU ARE COUNTING DOWN AND THE TRANSMITTER IS HITTING.
8. OPEN CCP.
9. TURN COMPUTER ON.
10. SET FIRE CONTROL MODE SWITCH TO EMERGENCY, ***VERIFY THAT DRIFT IS WITHIN TOLERANCE.***
11. SET GUN SELECT SWITCH TO MAIN.
12. SET AMMUNITION SELECT TO SABOT.
13. PRESS CROSS WIND KEY, ENTER 0.0, PRESS ENTER KEY, **BUTTON MUST REMAIN LIT.**
14. PRESS CANT KEY, ENTER 0.0, PRESS ENTER KEY, **BUTTON MUST REMAIN LIT.**
15. PRESS LEAD KEY, ENTER 0.0, PRESS ENTER KEY, **BUTTON MUST REMAIN LIT.**
16. PRESS AMMO SUBDES KEY, ENTER 59, PRESS ENTER KEY. CLOSE COVER.
17. PRESS RANGE KEY ENTER RANGE TO BORESIGHT TARGET, PRESS ENTER KEY. **BUTTON MUST REMAIN LIT.**
18. PRESS GUNNER OR COMMANDERS PALM SWITCH. THIS INDUCES THE RANGE.
19. SET FIRE CONTROL MODE TO MANUAL.
20. PUSH ZERO BUTTON AND ENTER 0.0, 0.0 AND PUSH ENTER.
21. PRESS BORESIGHT KEY AND ENTER 0.0, 0.0, AND PUSH ENTER.
22. LOOK THROUGH GPS AND MANUALLY MOVE GUN TO BORESIGHT TARGET.
23. INSTALL TRANSMITTER IN THE BREECH, AND ALIGN THE TRANSMITTER SCOPE AS CLOSE TO THE SAME POINT AS THE GPS RETICLE, INSURE IT IS TIGHT.
24. ALIGN TRANSMITTER SCOPE TO BORESIGHT TARGET USING MANUAL TURRET ROTATION AND ELEVATION CRANK HANDLES.
25. USING THE RETICLE ADJUST TOGGLE SWITCH, TOGGLE THE GPS RETICLE BACK TO CENTER MASS OF THE BORESIGHT TARGET.
26. CONFIRM CPS AND MILES RETICLE IS STILL ON THE SAME AIMING POINT ON BORESIGHT TARGET.
27. **BORESIGHT IS NOW COMPLETE -- THE OPTICS ARE LINED UP WITH THE BORE -- WE WILL NOW ZERO IN THE BORESIGHT MODE.**

ZEROING THE MAIN GUN IN THE BORESIGHT MODE.

1. GUNNER AIMS CENTER MASS OF BORESIGHT TARGET AND FIRES, IF TARGET FLASHES STOP AND GO STEP 3, IF THERE IS NO FLASH MANUALLY MOVE THE GUN AROUND THE TARGET UNTIL IT FLASHES, THEN STOP AND GO TO NEXT STEP.

NOTE: INSURE GUNNERS AND LOADERS RDA'S FUNCTIONS ARE FOLLOWED ACCORDING TO MILES LOADING PROCEDURES. (SEE M1 RDA LOADING.)

2. ONCE STEP ONE IS ACCOMPLISHED, TOGGLE RETICLE SWITCH CENTER MASS OF TARGET.
3. HAVE THE GUNNER AIM ½ MIL LOWER (MOVE GUN DOWN) AND FIRES, CONFIRMING THE HIT.

4. HAVE GUNNER CONTINUE LOWERING HIS AIMING POINT AND CONFIRMING HIS HIT ½ MIL AT A TIME UNTIL HE NEAR MISSES THE TARGET TWICE FIRING AT THE SAME AIMING POINT. THE GUNNER THEN REFERS HIS SIGHT CENTER MASS OF TARGET, USING THE TOGGLE ADJUST SWITCH.
 5. THE GUNNER THEN AIMS ½ MIL UP (MOVE GUN UP) AND FIRES, CONFIRMING THE HIT.
 6. HAVE THE GUNNER CONTINUE RAISING HIS AIMING POINT AND CONFIRMING HIS HIT ½ MIL AT A TIME UNTIL HE NEAR-MISSES THE TARGET TWICE FIRING AT THE SAME AIMING POINT. NOW THE GUNNER WILL LOOK AT THE TWO POINTS WHERE THE RETICLE IS AND CENTER MASS OF THE TARGET AND DIVIDE THIS AREA IN ½. NOW MOVE THE RETICLE TO THAT POINT (USING TOGGLE ADJUST SWITCH). THIS IS THE "MEAN" (POINT OF IMPACT) FOR ELEVATION.
 7. TO FIND THE MEAN (POINT OF IMPACT) FOR DEFLECTION, DO THE SAME EXCEPT MOVE RIGHT TO LEFT.
 8. AFTER GUN IS ZEROED, PUSH ENTER, THEN SQUEEZE PALM GRIPS FOR 2 SECONDS, THEN REFER THE TIS AND GAS (1200 SABOT) TO THE GPS SIGHT AND CLOSE THE CCP DOOR.
 9. CHECK THAT THE TIS READY LIGHT IS LIT. WHEN IT IS LIT, SET THERMAL MODE SWITCH FROM STANDBY TO ON.
 10. SET FLT/CLEAR/SHTR SWITCH TO SHTR.
 11. USING TIS RETICLE AZIMUTH AND ELEVATION BORESIGHT KNOBS REFER TIS RETICLE TO BORESIGHT AIMING POINT.
 12. SET FLT/CLEAR/SHTR SWITCH TO CLEAR, ENSURE GPS RETICLE AND TIS RETICLE ARE ALL ON THE SAME AIMING POINT.
 13. RECORD AZIMUTH AND ELEVATION KNOB SETTINGS FROM TIS BORESIGHT KNOBS FOR FUTURE REFERENCES.
 14. ALIGN GAS WITH BORESIGHT TARGET AIMING POINT, USE GAS AZIMUTH AND ELEVATION KNOBS.
 15. SET FIRE CONTROL SWITCH TO NORMAL.
 16. USING POWER CONTROL HANDLES, MOVE GPS OFF AND THEN BACK ON THE TARGET IN A G PATTERN. ENSURE MILES RETICLE, GPS RETICLE AND GAS 1200 METER RANGE LINE (APFSDS) ARE ALL ON THE SAME POINT ON THE BORESIGHT TARGET.
 17. VERIFY BORESIGHT BY FIRING MAIN GUN AT A MILES INSTRUMENTED TARGET.
- NOTE:** AFTER COMPLETING TRAINING WITH MILES, ANY DATA TAKEN OUT OF THE COMPUTER MUST BE RE-ENTERED.

SYSTEM PARALLAX FOR THE M1A1 TANK

- GPS
- 28 ¾ INCHES TO THE RIGHT AND 20 7/8 INCHES UP.
- .73 METERS TO THE RIGHT AND .53 METERS UP.
- TIS
- 34 5/8 INCHES TO THE RIGHT AND 20 7/8 INCHES UP.
- .88 METERS TO THE RIGHT AND .52 METERS UP.
- GAS
- 12 ¼ INCHES TO THE RIGHT AND 5 INCHES DOWN.
- .31 METERS RIGHT AND .13 METERS DOWN.

NOTE: IF YOU READ TM 9-2350-264-10-PAGE 2-292 YOU WILL SEE A "NOTE"

IN OPERATIONAL SITUATIONS, THE M1A1 MAY BE BORE SIGHTED AND ZEROED AT ANY KNOWN DISTANCE BETWEEN 200 AND 4000 METERs. PARALLAX HAS BEEN ELIMINATED IN THE GPS

AND TIS. HOWEVER, PARALLAX HAS NOT BEEN ELIMINATED IN THE GAS. THEREFORE, A 1200-METER TARGET IS RECOMMENDED FOR THE GAS.

BORESIGHT/ZERO M-2 .50 CAL MACHINE GUN ON THE M1A1 TANK

1. ENSURE THAT THE M-2 MACHINE GUN HAS BEEN CLEARED OF ALL AMMO.
2. POSITION A MAN WITH A MWLD ON AND GREEN KEY SET TO RESET AT 75-100 METERS IN FRONT OF TANK.
3. BORESIGHT THE M2 HB MACHINE GUN WITH THE ANSEERSON/50 CAL. BORESIGHTING DEVICE. ALIGN THE BORE OF THE M-2 MACHINE GUN CENTER MASS OF THE TARGET MAN.
4. POSITION TANK ON LEVEL GROUND WITH GUN OVER FRONT SLOPE.
5. ONCE THE BORE OF THE GUN IS ALIGNED, REFER THE 500 METER AIMING POINT OF THE 50 CAL RETICLE CENTER MASS OF THE TARGET MAN.
6. WITH A DRY FIRE CABLE INSTALLED, FIRE AT THE TARGET, IF THE TARGET MAN IS "HIT" HE WILL SIGNAL.
7. DO NOT MOVE THE GUN, BUT HAVE THE TARGET MAN TAKE A SIDE STEP TO THE RIGHT UNTIL HE HAS A MISS.
8. ONCE HE HAS A MISS, HE WILL THEN MARK THE SPOT, AND MOVE BACK TO THE START POINT.
9. FIRE AT THE TARGET MAN, IF HE IS "HIT" HE WILL SIGNAL, AGAIN DON'T MOVE THE GUN, AND HAVE THE TARGET MAN TAKE A SIDE STEP TO THE LEFT UNTIL HE HAS A NEAR MISS THIS TIME MOVE IN THE OPPOSITE DIRECTION.
10. NEAR MISS HAS BEEN VERIFIED HAVE THE TARGET MAN MOVE TO THE CENTER, AND WITHOUT MOVING THE LAY OF THE GUN, REFER YOUR 500 METER AIMING POINT TO CENTER MASS OF THE TARGET MAN.
11. TO FIND THE ELEVATION, FIRE THE GUN MOVING IT DOWN UNTIL YOU HAVE A NEAR MISS. THIS TIME DON'T MOVE THE GUN. BUT MOVE THE 500 METER AIMING POINT CENTER MASS OF THE TARGET MAN. NOW FIRE THE GUN MOVING UP UNTIL YOU HAVE A NEAR MISS.

NOW MOVE THE 500 METER AIMING POINT HALF WAY DOWN TO THE TARGET MAN. MOVE THE GUN SO THAT THE 500 METER AIMING POINT IS CENTER MASS OF THE TARGET AND FIRE. YOU ARE NOW BORESIGHTED.

BORESIGHT THE COAX

- AFTER THE MAIN IS BORESIGHTED AND ZEROED IN THE BORESIGHT MODE, TURN GUN SELECT TO COAX.
- HOLD A MWLD IN FRONT OF MAIN GUN AND FIRE COAX BY TAPING THE COAX MICROPHONE ON A METAL OBJECT.
- THE LAST STEP IS TO FIRE BLANK AMMUNITION AT A TARGET TO VERIFY THE COMPLETE WEAPON SYSTEM IS FUNCTIONAL.

LOADER'S 240 MG

- WITH A DRY FIRE CABLE ON THE TRANSMITTER, HOLD A MWLD IN FRONT OF TRANSMITTER AND FIRE TO VERIFY THE TRANSMITTER IS HITTING.
- HAVE A TARGET AT 50 TO 75 METERS AND FIRE AT TARGET TO DETERMINE POINT OF AIM -- VERY SIMILAR TO 50 CAL ALIGNMENT.

THE LAST STEP IS TO FIRE BLANK AMMUNITION TO VERIFY THE COMPLETE WEAPON SYSTEM

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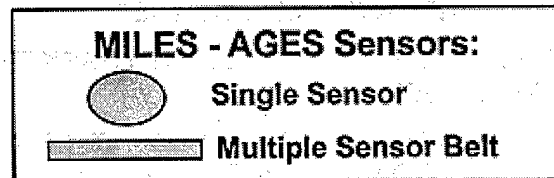
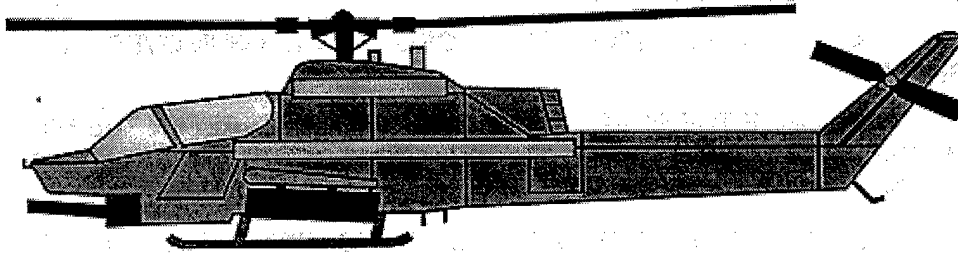
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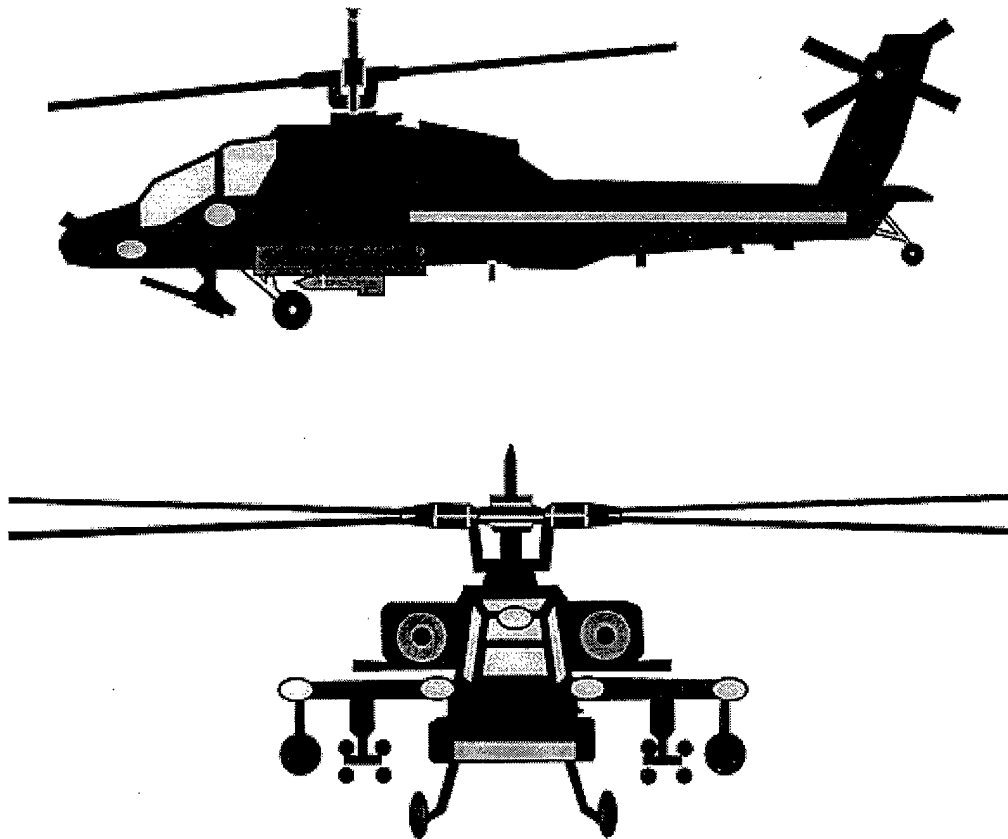
ROTARY WING

SENSOR PLACEMENT GUIDES

AH - 1 MILES - AGES SENSOR PLACEMENT



AH - 64 MILES - AGES SENSOR PLACEMENT



MILES - AGES Sensors:

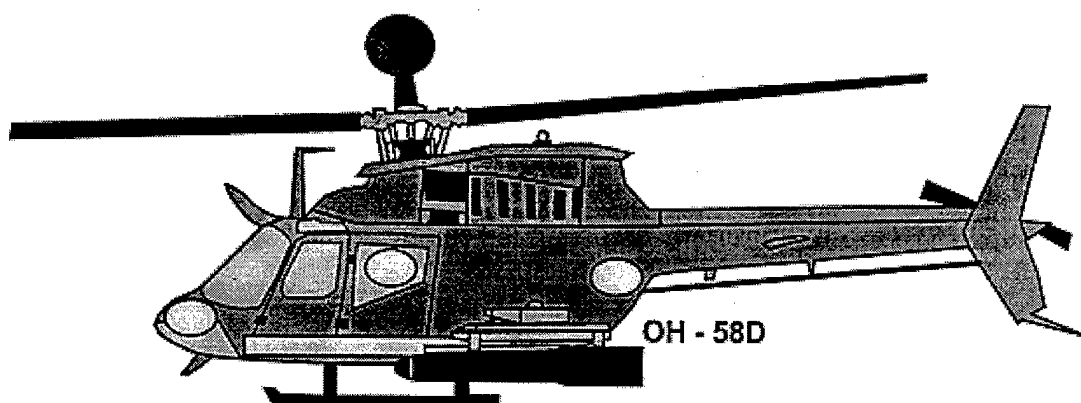
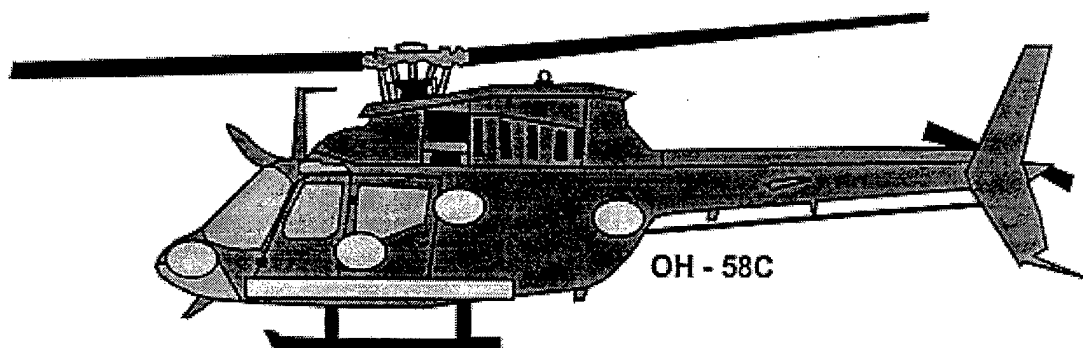


Single Sensor



Multiple Sensor Belt

OH - 58 MILES - AGES SENSOR PLACEMENT



MILES - AGES Sensors:

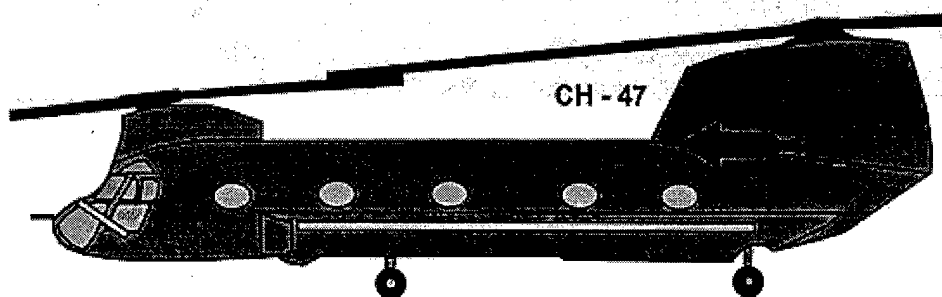
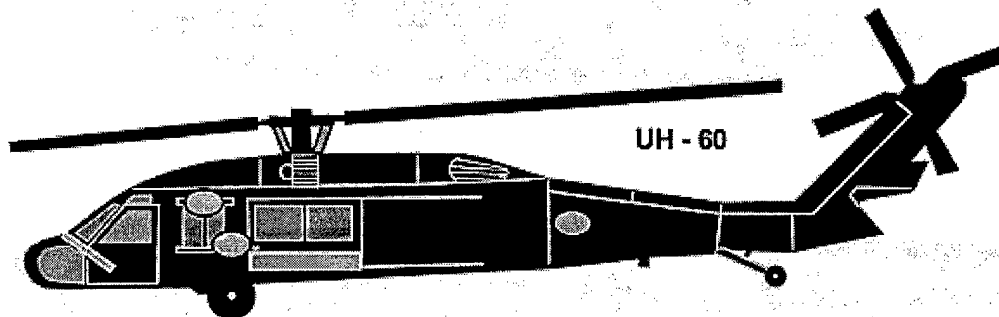
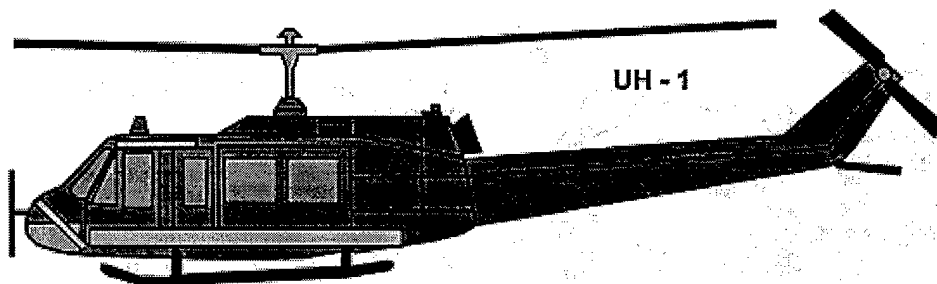


Single Sensor



Multiple Sensor Belt

UH - 1, UH - 60, CH - 47 MILES - AGES SENSOR PLACEMENT



MILES - AGES Sensors:



Single Sensor



Multiple Sensor Belt

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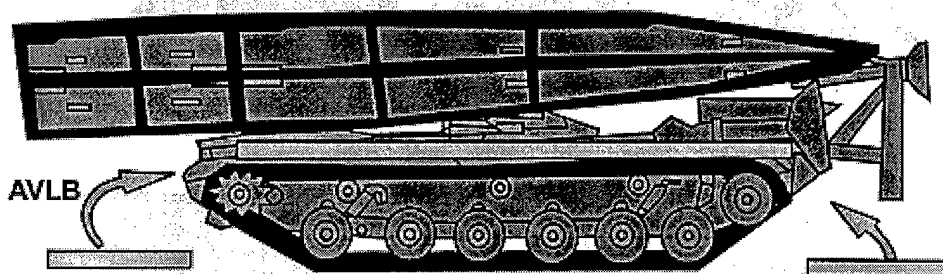
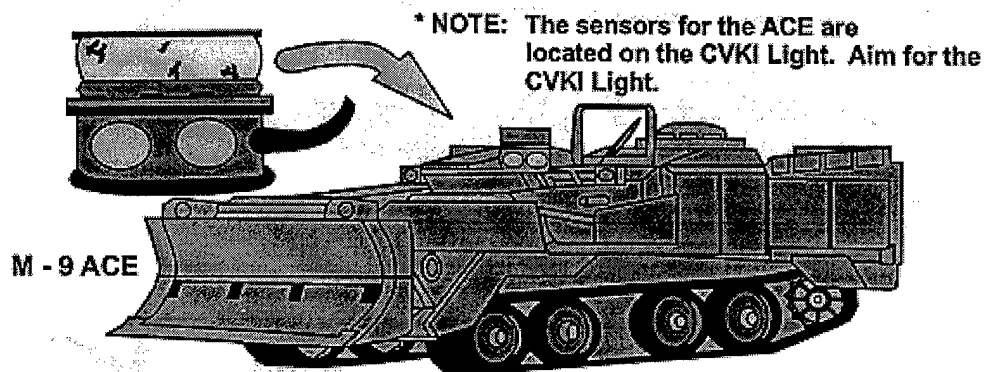
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ENGINEER VEHICLE

ENGINEER VEHICLE MILES SENSOR PLACEMENT



* NOTE: On the AVLB, there are two (2) MILES Belts located on both the front and rear ends of the vehicle.

MILES - AGES Sensors:



Single Sensor



Multiple Sensor Belt

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APPENDIX A

WEAPONS HIT CODES

NTC WEAPON HIT CODES

CODE	WPN	RANGE	CODE	WPN	RANGE
00	CONTR-GUN	1000	18	8IN 105 HOW, 122MM, 155 MM	MILES ONLY
01	MAVERICK	3-6 MILES	19	40MM GERNADE	1500
02	HELLFIRE	8000	20	ROCKEYE MISSILE (CLUSTER BOMB	
03	AT-3 SAGGER BMP	1500	21	30MM A10 GAU-8 HIT	2000
04	60-81MM, 4.2 ROCKET		22	25MM, 23MM, (OPFOR) ZSU, AAA	3000
05	ZSU RADAR LOCK ON MODE		23	VULCAN, ACFT 20MM, 30MM-HIND- D, 30MM BMP II	1600
06	WPN XXX		24	M2-M85 50CAL	1600
07	TQW, AT-6 HIND-D, AT-8 SONGSTER, SHILLELAGH, AT-5 SPANDRELL	3750	25	CHAPARRAL, RFSAM, IRSAM	6000
08	DRAGON, AT-4 SPICOT	1000	26	STINGER, SA-14, AVENGER	4000
09	M202-FLAME		27	M16RFL, M60 MG, COAX MG	460-800
10	M21 AT, 125MM T-80, 125MM 2A45M	3000	28	HEAVY WPN MISS	800
11	M18 CLAYMORE		29	LT WPN MISS	460
12	105MM	3000	30	OPT RESET-BY MCS-CIS	1000
13	152-122MM, 122 MM, M1974 HOWITZER	3000	33	SA-14	
14	2.75-57MM 73MM BMP, HIND-D 57MM, 2S6	3000	34	ZSU 23-4 RADAR MODE	2800
15	VIPER LAW	300	MINE	AT-MES AP-MES	4-6 METERS 8-10 METERS
16	120MM	3000			
17	90MM				

NTC INDIRECT FIRE HIT CODES

CODES	WEAPON	CODES	WEAPONS
M720-PD	60MM HE	F620-VT	203MM HE
M821-PD	81MM HE	XDP620	203MM DPICM
M1-PD	105MM HE	9M22YF-PD	132MM MLRS HE
M1-VT	105MM HE	9M22KX	122MM MLRS HE
M444	105 MM APICM	9M27F-PD	220MM MLRS APCIM
M107-PD	155MM HE	9M27F-KX	220MM MLRS DPCIM
M107-VT	155MM HE	FROG-PD	540MM ROCKET
M4449A1	155MM APICM	CONVO42	
M483A1	155MM DPICM	CONV200	
M106-PD	8 IN HE	CHEMA1	BLISTER
M106-VT	8 IN HE	CHEMB1	NERVE I
M404	8 IN APICM	CHEMB2	NERVE U
M504A1	8 IN DPICM	CHEMC1	BLOOD I
M26	MLRS DPICM	CHEMC2	BLOOD U
MK49	5 IN 38 HE	CHEMD1	CHOKING I
MK59	5 IN AAC	CHEMD2	CHOKING U
MK61	5 IN HE	NUCLEAR	
MK41	5 IN 54 AAC	W10 Y1	SHORT RANGE
MK25	8 IN HE	W10 Y2	SHORT RANGE
MK13	16 IN HE	W15 Y1	MID RANGE
MG 76-PD	76 MM HE	W15 Y2	MID RANGE
VO 82-PD	82MM HE	W20 Y1	FREE FLIGHT ROCKET
OF843A-PD	120MM HE	W30 Y1	ATOMIC DEM MUNI.
OF843A-VT	120MM HE	W30 Y2	ATOMIC DEM MUNI.
OF24-PD	122MM HE	W30 Y3	ATOMIC DEM MUNI.
OF24-VT	122MM HE	W40 Y1	GUIDED MISSILE
F853-PD	160 MM HE	W40 Y2	GUIDED MISSILE
F864-PD	240MM HE	W50 Y1	BOMB
F864-VT	240MM HE	W50 Y2	BOMB
OF482-PD	130MM HE	W50 Y3	BOMB
OF482-VT	130MM HE		
OF25-PD	152MM HE		
OF25-VT	152MM HE		
XDP540	152MM DPICM		
F620-PD	203MM HE		

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[Appendix B - Vehicle Vulnerabilities & PK Factors](#)

APPENDIX B

VEHICLE VULNERABILITIES & PK FACTORS

SAWE/MILES II VEHICLE VULNERABILITY HARDNESS MATRIX

TANK SYSTEMS

	Hardness Factor		
	<u>Front</u>	<u>Side</u>	<u>Rear</u>
M1	4	3	2
M1A1	5	4	2
M60A1/A3	3	2	1
T72	4	3	2
T80	5	4	2

VEHICLE SYSTEMS

M2A2	5	4	3
M3A2	5	4	3
BMP II	5	4	4
BMP I	5	4	3
M1974 (2S1)	4	3	4
M113	3	3	4
M901	3	3	4
ZSU 23/4	2	2	2
M551	3	3	3
BRDM II	1	1	1

OTHERS

HMMWV	1	1	1
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The guidelines below should be followed in reviewing the Hardness Matrices:

1. The Tank and Vehicle Hardness Matrices are to be evaluated separately; that is, a hardness factor of 5 for a tank is not equivalent to a hardness factor of 5 for a vehicle.
2. A hardness factor of 5 represents the hardest (i.e., most armor or protection) while a hardness factor of 1 represents the lowest level of protection within a given matrix.
3. The relative hardness factors assigned to each tank or vehicle aspect represents "reasonable" unclassified values.
4. The generation of more than 5 hardness factors per matrix is not recommended in that the data may tend to approach actual classified values.

VEHICLE VULNERABILITY M1A1 Tank - 120 mm

MILES Code*	Catastrophic PK Factors			
	Front Zone 1	R Side Zone 2	Rear Zone 3	L Side Zone 4
00	100	100	100	100
01	100	100	100	100
02	60	90	100	90
03	10	40	90	40
04	0.50	1	10	1
05	0.50	0.50	0.50	0.50
06	NE	NE	NE	NE
07	25	35	30	35
08	2	10	30	10
09	50	70	90	70
10	10	20	30	20
11	NE	NE	NE	NE
12	25	35	40	35
13	0.50	5	10	5
14	0.50	10	30	10
15	0.50	5	20	5
16	30	40	45	40
17	0.50	10	30	10
18	0.50	5	10	5
19	0.50	0.50	1	0.50
20	1	10	40	10
21	1	3	15	3
22	0.50	0.50	1	0.50
23	0.50	0.50	1	0.50
24	0.50	0.50	0.50	0.50
25	NE	NE	NE	NE
26	NE	NE	NE	NE
27	NE	NE	NE	NE
28	NM	NM	NM	NM
29	NM	NM	NM	NM
30	OP	OP	OP	OP
31	NM	NM	NM	NM
32	NE	NE	NE	NE
33	NE	NE	NE	NE
34	NE	NE	NE	NE

Aspect Angle Modified (Main Gun Direction)

Position	Zone 1	Zone 2	Zone 3	Zone 4
1-Ft	1.00	1.00	1.00	1.00
2-RtFt	1.25	1.12	1.16	0.95
3-Rt	1.50	1.25	1.33	0.75
4-RtRr	1.75	1.12	1.00	0.88
5-Rr	2.00	1.00	0.67	1.00
6-LtRr	1.75	0.88	1.00	1.12
7-Lt	1.50	0.75	1.33	1.25
8-LtFt	1.25	0.88	1.16	1.12

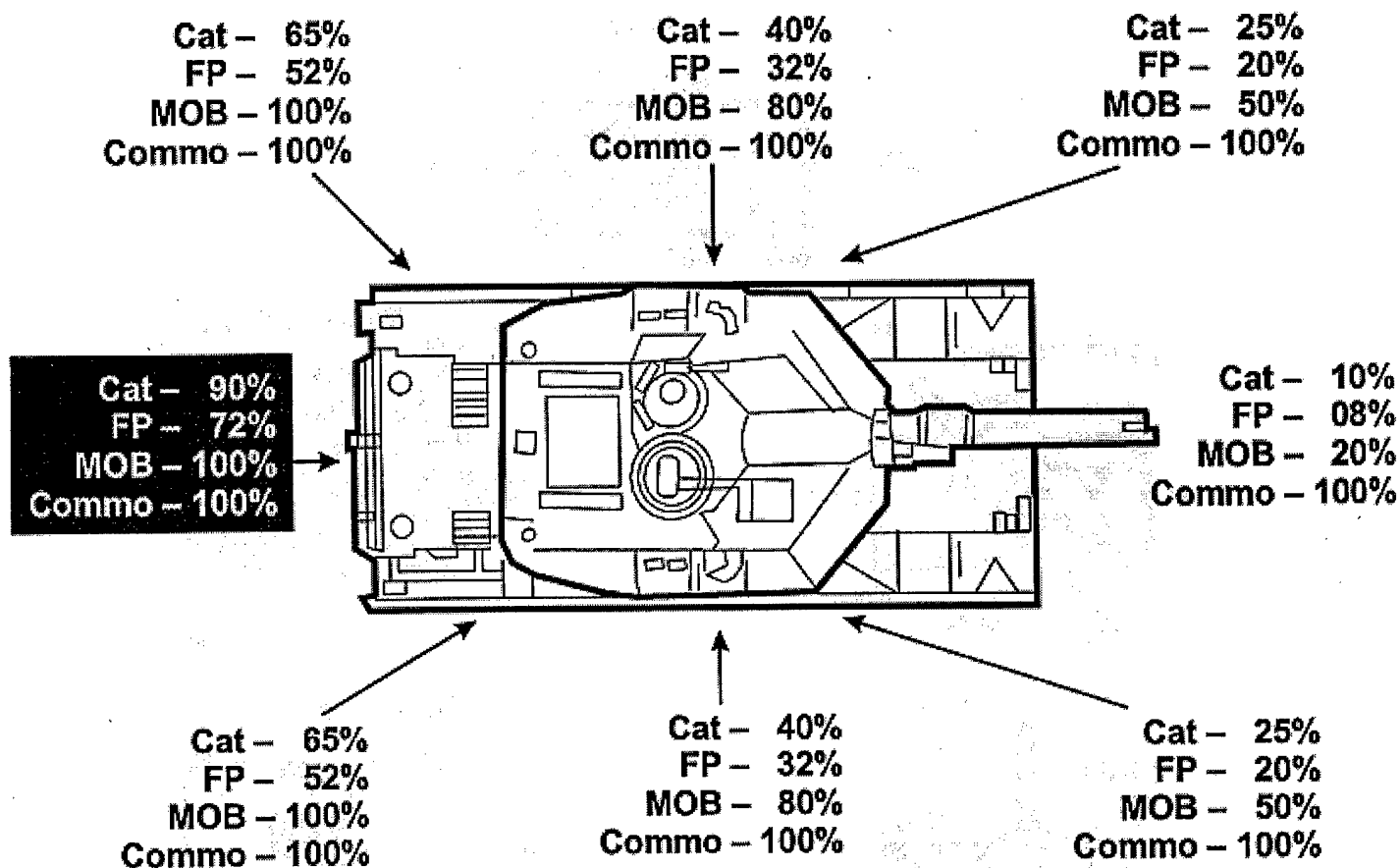
Sub PK Factors			Ammo Factors			
FpK	MobK	ComK	#1	#2	#3	#4
1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.80	1.25	1.00	1.00	1.00	1.00	1.00
0.80	2.00	10.0	1.00	1.00	1.00	1.00
1.00	4.00	20.0	1.00	1.00	1.00	1.00
0.02	200	0.02	1.00	1.00	1.00	1.00
1.50	2.00	2.25	1.00	1.25	1.00	1.00
1.00	5.00	50.0	1.00	1.50	1.00	1.00
0.10	0.50	2.00	1.00	1.00	1.00	1.00
2.50	3.00	5.00	1.00	0.50	1.00	1.00
1.50	1.75	3.00	1.00	0.50	1.00	1.00
1.00	4.00	10.0	1.00	0.50	1.00	1.00
1.00	3.00	10.0	1.00	2.00	1.00	1.00
1.00	4.00	8.00	1.00	2.00	1.00	1.00
1.50	1.75	3.00	1.00	0.50	1.00	1.00
1.00	4.00	8.00	1.00	0.50	1.00	1.00
1.00	4.00	10.0	1.00	1.00	1.00	1.00
0.02	0.50	5.00	1.00	1.00	1.00	1.00
1.00	3.00	10.0	1.00	1.00	1.00	1.00
10.0	5.00	33.3	1.00	1.00	1.00	1.00
0.02	0.50	5.00	1.00	0.50	1.00	1.00
0.02	0.50	5.00	1.00	0.50	1.00	1.00
0.02	0.02	4.00	1.00	1.00	1.00	1.00

LEGEND: FpK - Firepower Kill
 MobK - Mobility Kill
 ComK - Commo Kill
 NE - No Effect
 NM - Near Miss
 OP - Optical Reset
 Ft - Front Aspect
 Rt - Right Aspect
 Rr - Rear Aspect
 Lt - Left Aspect
 RtFt - Right Front Aspect
 RtRr - Right Rear Aspect
 LtRr - Left Rear Aspect
 LtFt - Left Front Aspect

*MILES Code: See page A-1

PK Data Information Sheet

M1A1 Being Shot at by an AT-3 (Kill Code 03)

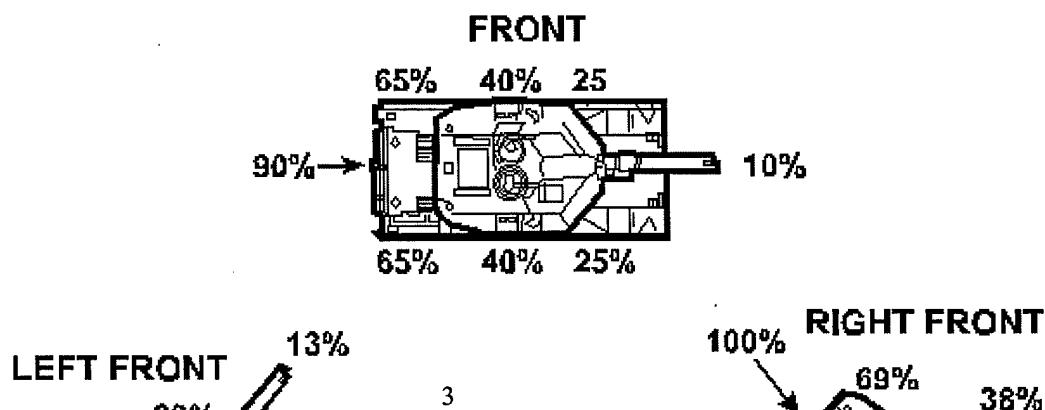


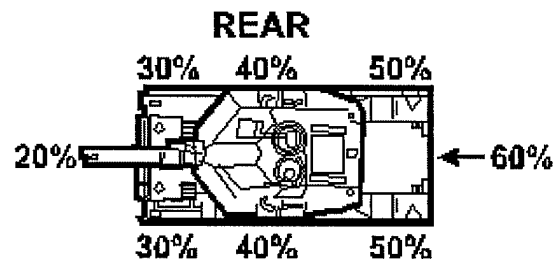
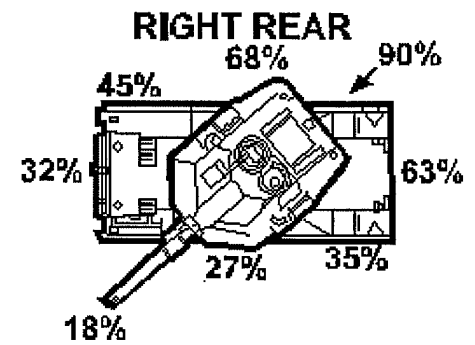
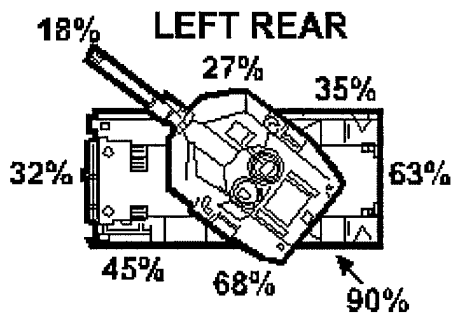
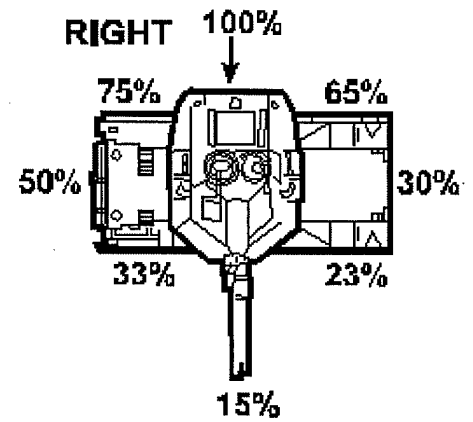
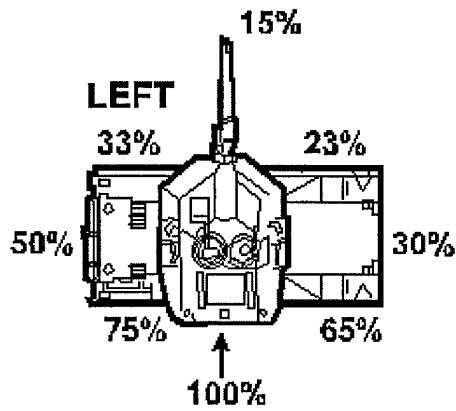
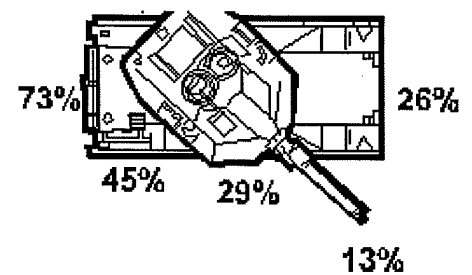
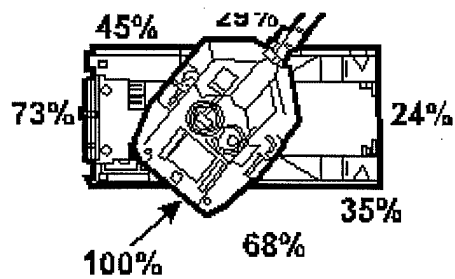
Legend	
Cat = Catastrophic Kill	
FP = Fire Power Kill	
MOB = Mobility Kill	
Commo = Communication Kill	
	Box around statistics indicates the best angle of attack.

PK Data Information Sheet

M1A1 Being Shot at by an AT-3 Missile (Kill Code 03)

Aspect Angle Modified – Direction of Main Gun

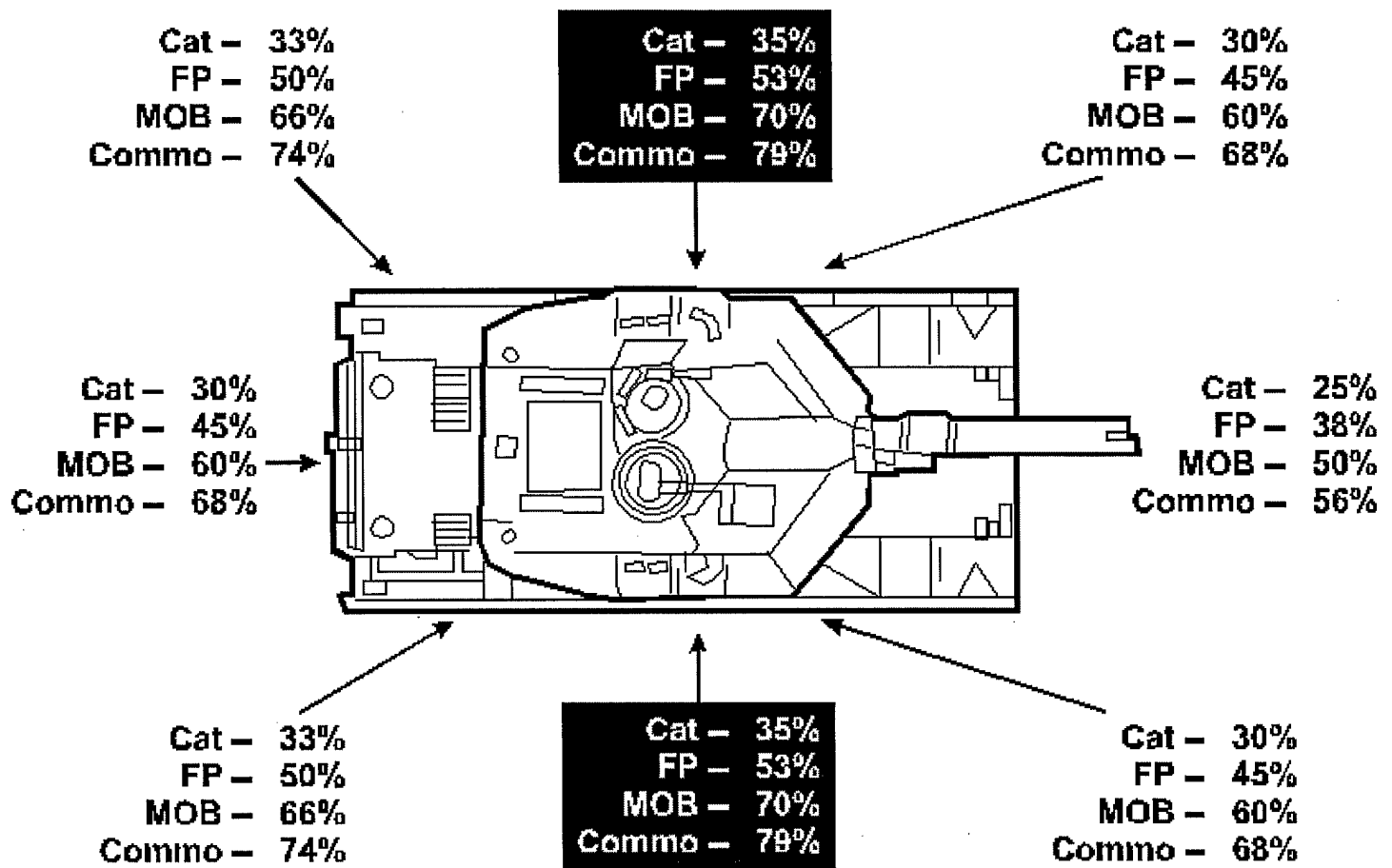




* Arrow indicates the best angle of attack.

PK Data Information Sheet

M1A1 Being Shot at by an AT-5 (Kill Code 07)

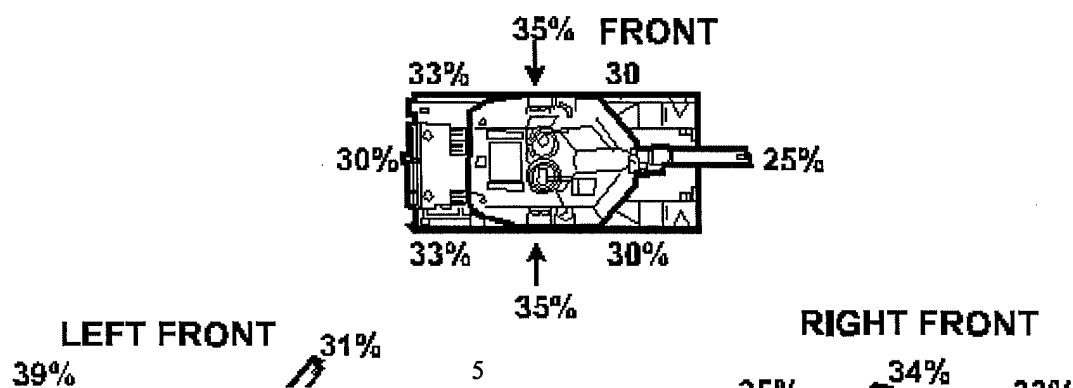


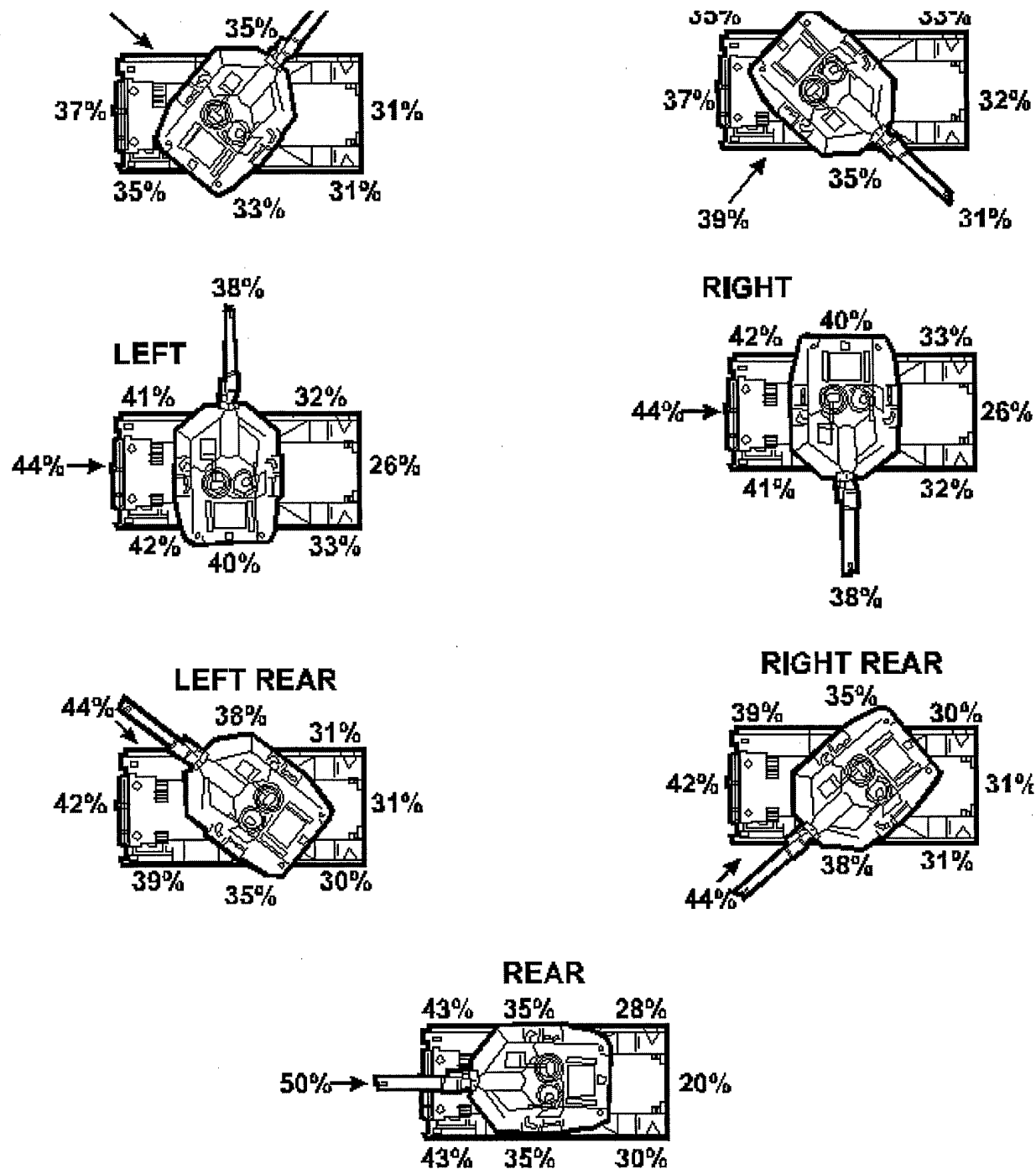
Legend	
Cat = Catastrophic Kill	
FP = Fire Power Kill	
MOB = Mobility Kill	
Commo = Communication Kill	
	Box around statistics indicates the best angle of attack.

PK Data Information Sheet

M1A1 Being Shot at by an AT-5 Missile (Kill Code 07)

Aspect Angle Modified – Direction of Main Gun

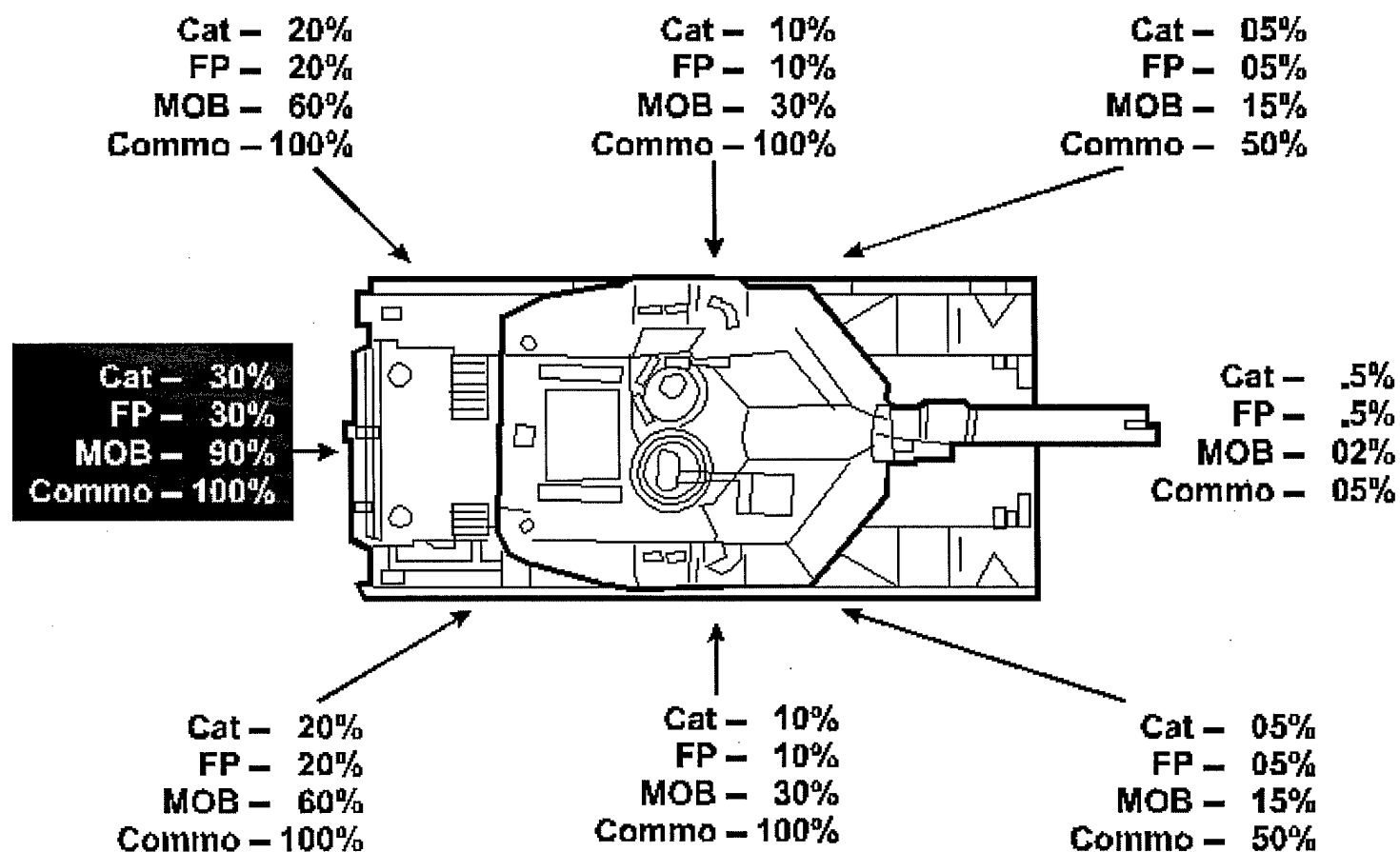




* Arrow indicates the best angle of attack.

PK Data Information Sheet

M1A1 Being Shot at by a BMP-1, 73-mm (Kill Code 14)

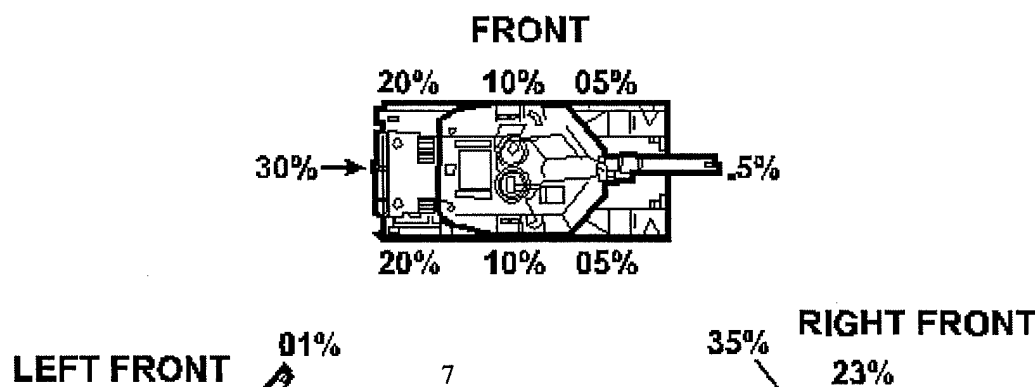


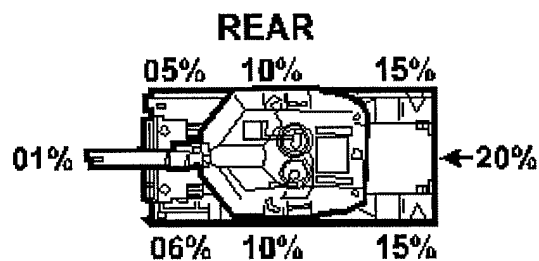
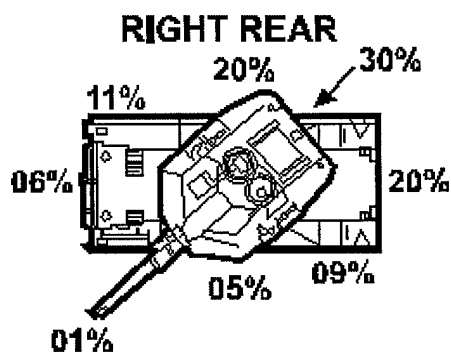
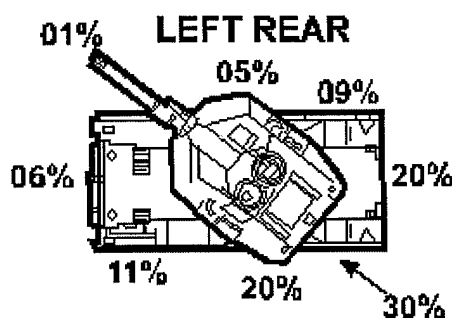
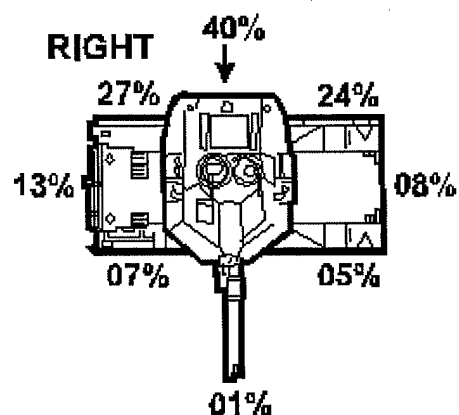
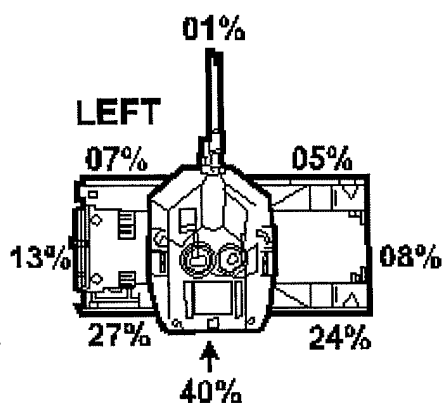
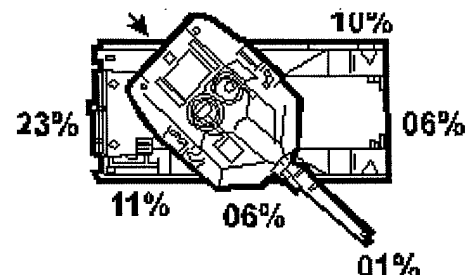
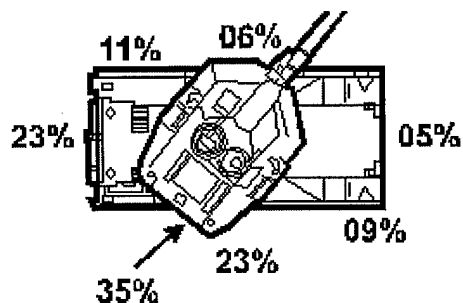
Legend	
Cat = Catastrophic Kill	
FP = Fire Power Kill	
MOB = Mobility Kill	
Commo = Communication Kill	
<div style="display: inline-block; width: 20px; height: 20px; background-color: black; border: 1px solid black;"></div>	Box around statistics indicates the best angle of attack.

PK Data Information Sheet

M1A1 Being Shot at by a BMP-1, 73-mm (Kill Code 14)

Aspect Angle Modified – Direction of Main Gun





* Arrow indicates the best angle of attack.

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APPENDIX D

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Loral Electro-Optical Systems

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Acknowledgements

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David Romero

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Lyle Daniels
Rodney Williams

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